National Milk Producers Federation (NMPF) does not endorse any of the veterinary drugs or tests identified on the lists in this manual. The lists of veterinary drugs and tests are provided only to inform producers and veterinarians what products may be available, and the producer and veterinarian are responsible for determining whether to use any of the veterinary drugs or tests. All information regarding the veterinary drugs or tests was obtained from the products’ manufacturers or sponsors, and NMPF has made no further attempt to validate or corroborate any of that information. NMPF urges producers to consult with their veterinarians before using any veterinary drug or test, including any of the products identified on the lists in this manual. In the event that there might be any injury, damage, loss or penalty that results from the use of these products, the manufacturer of the product or the producer using the product shall be responsible. NMPF is not responsible for, and shall have no liability for, any injury, damage, loss or penalty.
# Table of Contents

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Residue Prevention Best Practices</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Record Keeping and Herd Health Protocols</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>Drug Administration</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>Culling of Animals</td>
<td>14</td>
</tr>
<tr>
<td>6</td>
<td>Residue Testing</td>
<td>17</td>
</tr>
<tr>
<td>7</td>
<td>Drug Classes</td>
<td>22</td>
</tr>
<tr>
<td>8</td>
<td>Approved Drugs and Screening Tests</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td><strong>Glossary</strong></td>
<td>67</td>
</tr>
<tr>
<td></td>
<td><strong>Contact Information</strong></td>
<td>69</td>
</tr>
</tbody>
</table>
Foreword

The goal of our nation’s dairy farmers is to produce the best tasting and most wholesome milk possible. Our consumers demand the best from us and we meet their needs and exceed their expectations every day.

Day in and day out, our dairy farmers provide the best in animal husbandry. Continually, we evaluate our best management practices and disease prevention protocols to keep our animals healthy and comfortable. There are occasions when animals may get sick and need antimicrobial therapy to overcome a specific disease challenge. As dairy producers, we strategically and prudently use our antimicrobial therapy to help an individual animal that has been threatened with a disease. We take this responsibility of prudent antimicrobial use seriously and take many precautions with our antibiotic-treated animals so that their milk or meat does not enter the food supply.

The avoidance of milk and meat residues in the dairy industry takes an on-farm team effort that begins with the VCPR – the Veterinarian-Client-Patient Relationship. Dairy farm owners/managers/herdsman work with their veterinarians to develop treatment protocols that ensure that antimicrobials are used correctly. Once a decision is made to use antimicrobials, protocols are in place to guide employees on the safe way to handle the animal to prevent an inadvertent milk or meat residue from occurring. Identification of treated animals and recording drug use are essential to prevent residues.

For 30 years, each revision of the Milk & Dairy Beef Drug Residue Prevention Reference Manual has served as the U.S. dairy industry’s commitment to antimicrobial stewardship – the prudent and responsible use of antibiotics and other drugs in dairy animals. This year’s revised manual is a quick resource to review those drugs approved for dairy animals and can also be used as an educational tool and resource for farm managers as they develop on-farm best management practices. I encourage all dairy farmers to sit down with their veterinarians and employees to review this manual as you will find the information useful, practical and easily applied to your individual farms.

Sincerely,

Karen Jordan, DVM
Dairy Producer Chair
NMPF Animal Health and Well-being Committee
Chapter 1: Introduction

The U.S. dairy industry is committed to producing the highest quality, safe, abundant and affordable milk and dairy beef. Healthy animals help make for safe food, and disease prevention is the key to keeping cows healthy. When dairy animals get sick and treatment is necessary, producers and veterinarians utilize antibiotics and other drugs prudently. Antimicrobials must be used appropriately under veterinary guidance to prevent residues from occurring in milk and dairy beef. The marketing of milk or dairy beef with drug residues, even unintentionally, is illegal and can result in financial and criminal penalties.

Antimicrobial Stewardship
Antimicrobial stewardship goes beyond an individual dairy farmer’s actions. It extends across all livestock production, and use of antimicrobials in companion animals and humans. Misuse and overuse of antimicrobials is one of the world’s most pressing public health concerns. Infectious organisms adapt to antimicrobials designed to kill them, making the drugs less effective. The Food and Drug Administration Center for Veterinary Medicine (FDA CVM) has committed to antimicrobial stewardship for use in animals through principles and key initiatives.

FDA CVM Principles Critical to Curbing or Slowing the Emergence of Antimicrobial Resistance:

1. Antimicrobial drugs should only be used when necessary to treat, prevent or control disease.

2. When antimicrobials are used, these drugs should be administered in an optimal manner under the supervision of a licensed veterinarian.
Key Initiative 1:

**Align antimicrobial drug products with the principles of antimicrobial stewardship in veterinary settings**

In an effort to align all approved medically important antimicrobial drug products with the principles of antimicrobial stewardship, FDA is undertaking three important initiatives:

- On an ongoing basis, FDA will continue to enhance FDA processes to support innovation and new product development, including encouraging the development and deployment of new antimicrobials and alternatives to antimicrobials for addressing animal health needs.
- FDA will work with industry and other stakeholders to update the conditions of use for approved medically important antimicrobial drugs, as necessary, to align with the principles of prudent and responsible use.
- FDA will develop a strategy for antimicrobial stewardship in companion animals.

Key Initiative 2:

**Support efforts to foster stewardship of antimicrobials in veterinary settings**

As the regulatory agency responsible for ensuring that veterinary drugs are safe and effective, it is FDA’s role to take steps to promote antimicrobial stewardship, such as bringing medically important antimicrobials under veterinary oversight. These steps need to be supported with both education and compliance activities in order to ensure effective implementation.

- FDA will continue to work with stakeholders to help coordinate the agency’s actions with the broader effort to foster stewardship of antimicrobials in animals.
- FDA will launch a multi-year effort to support education. This includes, but is not limited to, enhancing online access to information regarding antimicrobial use, working with state agencies and key stakeholders to disseminate information on stewardship, and assisting academic institutions in developing veterinary curricula that address antimicrobial stewardship principals.
- FDA will finalize the VFD compliance program to ensure that veterinary professionals, feed mills and animal producers adhere to VFD requirements.
Key Initiative 3:

Assess the impact of strategies intended to curb the emergence of antimicrobial resistance associated with the use of antimicrobial drugs in veterinary settings

Gathering information on how medically important antimicrobials are used in animals is essential to understand the drivers of resistance in animal agriculture and the success of interventions designed to reduce the emergence of antimicrobial resistance. This is accomplished by:

- Enhancing the collection of antimicrobial drug use data in veterinary settings
- Enhancing the collection of data on antimicrobial resistance patterns
- Increasing the exchange of information among stakeholders to aid in the monitoring of antimicrobial drug use practices and resistance
Residue Prevention Best Practices

Causes of Antibiotic Residues in Milk and Meat

Drug residues can be avoided with a well-planned drug use program and implementation. Reasons given for milk and meat residues result from many on-farm situations. These include, but are not limited to, the following:

- Not working under a valid Veterinarian-Client-Patient Relationship
- Not following veterinarian’s recommendation when using any drug
- Not following the manufacturer or veterinarian prescribed label directions for correct treatment for the appropriate withdrawal time
- Poor identification of all cattle including bull calves
- Accidentally milking a treated cow into the bulk tank or not diverting from the bulk tank
- Long-term residue following treatment as a calf
- Use of medicated milk replacers in calves that may be sold for human consumption
- The use of prohibited drugs or aminoglycosides (e.g., gentamicin) in cattle. The USDA and FDA are still detecting gentamicin residues in cattle.
- The use of compounded medications in cattle. Animal liver and kidney function, particularly with poor animal metabolism, may not be able to keep up with multiple circulating drugs and therefore withholding times can be prolonged.
- The practice of spraying hairy heel warts with antibiotic sprays in the parlor during milk harvest is a potential source for antibiotic contamination of milk. This practice should be avoided.
- The use of sulfonamide (e.g. Di-Methox) products extra-label in lactating dairy cows.
### Examples of Products and Risk Factors for Residues

<table>
<thead>
<tr>
<th>Product</th>
<th>Risk Factors</th>
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<tbody>
<tr>
<td><strong>Ceftiofur</strong>&lt;br&gt;(also known as Cefti flex®, Excede®, Excenel®, Naxcel®, Spectramast®)</td>
<td>- Using the withholding time for one product when using another.&lt;br&gt;- The withholding times for each product are different.&lt;br&gt;- Not keeping accurate records to record the exact product given (Excede versus Excenel).&lt;br&gt;- Using the drug in an unapproved route of administration. Excede is labeled to be given at the base or pinna of the ear only. Spectramast is the only ceftiofur product labeled for intramammary administration. Using these drugs in a route of administration not listed on the label is prohibited.&lt;br&gt;- All products have a pre-slaughter withdrawal period, please consult prescribing veterinarian or manufacturer for withdrawal times.</td>
</tr>
<tr>
<td><strong>Enrofloxacin</strong>&lt;br&gt;(Baytril 100®)</td>
<td>- Extra-label use in food animals is prohibited.&lt;br&gt;- Only labeled for non-lactating dairy animals 20 months of age or less and beef animals for pneumonia.*</td>
</tr>
<tr>
<td><strong>Florfenicol</strong>&lt;br&gt;(Nuflor®)</td>
<td>- Sustained release has a longer withdrawal time.&lt;br&gt;- Not approved for dairy cattle over 20 months of age.&lt;br&gt;- No tolerance level for dairy cattle.</td>
</tr>
<tr>
<td><strong>Flunixin</strong>&lt;br&gt;(also known as Banamine®, Flu-Nix™, Flunixin meglumine**, Prevail™)</td>
<td>- Using the drug in an unapproved route of administration such as intramuscular or subcutaneous. These drugs are only approved for intravenous administration.&lt;br&gt;- Using another administration route results in extended withdrawal times, well beyond the labeled withholding time.</td>
</tr>
<tr>
<td><strong>Gentamicin</strong></td>
<td>- Use of gentamicin results in extended withdrawal times and therefore its use is discouraged by AVMA, AABP and AVC.&lt;br&gt;- Use of gentamicin in lactating dairy cows for intramammary use is not recommended.&lt;br&gt;- FARAD recommends not less than a TWO-YEAR withdrawal and, therefore, the use of this drug should not be considered.</td>
</tr>
<tr>
<td><strong>Neomycin</strong></td>
<td>- Not following withdrawal time on the bag.&lt;br&gt;- Feeding medicated milk replacer to calves to be processed for slaughter.&lt;br&gt;- Extra-label use of oral neomycin products.</td>
</tr>
<tr>
<td><strong>Penicillin</strong></td>
<td>- Increasing the dose without using an extended withdrawal period.&lt;br&gt;- Increasing the frequency or duration of administration without using an extended withdrawal period.&lt;br&gt;- Using the drug in a route of administration not approved, such as intramammary or subcutaneous.&lt;br&gt;- Giving more than 10 CC/injection site (as per label instructions).</td>
</tr>
<tr>
<td><strong>Sulfas</strong></td>
<td>- Using any sulfonamide product not labeled for lactating dairy cows is illegal.&lt;br&gt;- Using a higher dose or frequency of administration will result in extended withdrawal times.&lt;br&gt;- Inadvertently administering a sustained release product when intending to use a daily use product.</td>
</tr>
<tr>
<td><strong>Tetracycline</strong></td>
<td>- Single-site, large-volume injection through non-intravenous route.&lt;br&gt;- Extra-label use such as uterine infusion to treat an infected post-partum uterus.</td>
</tr>
</tbody>
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*Bovine respiratory disease (BRD); consult product label for actual indications.<br>**Due to the high risk of a violative residue, flunixin must only be used intravenously and not be given by either subcutaneous or intramuscular routes of administration.
Minimizing Drug Risk

Steps to Prevent Drug Residues

Dairy producers realize the importance of eliminating the possibilities of having drug residues in milk and dairy beef. Producers can take the following steps to mitigate or lessen the chances of antibiotic residues:

1. Establish a valid Veterinarian-Client-Patient Relationship (VCPR) to ensure proper diagnosis and treatment of disease. The agreement should be reviewed annually with a Veterinarian of Record (VOR) who makes routine visit to the farm.

2. Keep records of antibiotic use and identify all treated animals, including treatment protocols.

3. Implement a preventive Herd Health Plan to reduce the incidence of disease.

4. Maintain milk quality and implement an effective mastitis management program to reduce the use of antibiotics, including protocol development and review.

5. Implement employee training and awareness of proper animal drug use.

6. Use drugs approved for specific disease indications according to labeled recommendations and withdrawal periods. If extra label drug use is indicated by a veterinarian's prescription, that veterinarian must establish and document appropriate withdrawal periods.

7. Do not use drugs that are specifically prohibited for use in milking, dry or growing animals.

8. Segregate and milk treated animals after, or in a separate facility from, all non-treated animals to ensure that milk is not accidentally commingled.

9. Use drug residue screening tests specific for the drug utilized before marketing milk and/or meat from treated animals.

10. If in doubt about residue status, do not market milk and/or cull treated animals.

Food Animal Residue Avoidance Databank (FARAD)

FARAD is a congressionally-mandated risk management program that is supported by the USDA. The primary mission of FARAD is to provide science-based expert advice to help mitigate unsafe chemical residues (drugs, pesticides, biotoxins, etc.) in products derived from food animals.

FARAD provides the following services:

- Advice on residue avoidance or mitigation
- VetGram search for required withdrawal times for approved food animal drugs
- FARAD-recommended withdrawal intervals for extra-label use of approved food animal drugs

Producers should work with the veterinarian with whom they have a valid VCPR for drug residue information first. The veterinarian is the ideal resource to discuss FARAD-specific information regarding withdrawal times, especially for extra-label drug use.

Visit WWW.FARAD.ORG for more information.
Veterinarians must maintain written (or electronic) records for all animals treated for at least two years (or as otherwise mandated by federal or state law), to document that the drugs were supplied to clients in line with federal and state rules and policies. Though not a regulatory requirement, a good management practice for producers is to keep written (or electronic) records on all animals treated with drugs for at least two years. The records system should be easily accessible to everyone who works with the animals. Records should be permanent and maintained in written or computer records for at least two years, so the veterinarian has a history to which he/she can refer to prescribe effective therapy and to serve as protection in case of regulatory follow-up. The producer needs to show how all drugs purchased were used or disposed. The treatment record should contain the following basic information:

- Treatment date
- Animal identification
- Dosage
- Route of administration and expected duration
- Withdrawal time for milk and meat
- Individual who administered the drug
- Drug used
- Duration of therapy

**References**


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**Why Keep Drug Records?**

- Prevent an accidental violative residue
- Ensure effective herd health plan
- Improve your veterinarian’s effectiveness
- Reduce liability (drug records are required by law)
- Save money
8-STEP PLAN for Keeping Records

- **Step 1:** Recommended or Approved Drug List
  Early in your discussion with your herd health veterinarian you need to make a narrow list of drugs to be used on your dairy. The intent is to reduce the scope of drugs used. A short list will permit you to focus your knowledge and will help to prevent an accidental violation of antibiotic residue laws.

- **Step 2:** Animal Treatment Plan
  When practicing preventive medicine or treating early symptoms of a disease or infection, it is important to be consistent. The second step is for you to establish a treatment plan for your herd health practices. Review with your herd health veterinarian.

- **Step 3:** Beginning Inventory
  You and your herd health veterinarian should discard all old drugs and all drugs not on your approved drug list (Step 1) then annually inventory the remaining drugs and other appropriate information.

- **Step 4:** Record Medicated Feed Purchases
  Accidental antibiotic residues can occur from feeding practices as well as injections or other medical treatments. Be sure to clean feed equipment between batches. Carefully avoid disposing of leftover feed from feeder calves, hogs, etc., to lactating dairy cattle.

- **Step 5:** Record of Drug Purchases
  Most successful dairy producers will record every purchase of drugs the day they are purchased. The FDA requires a paper trail of all drugs used on your dairy, so it is important to record the purchase of drugs promptly.

- **Step 6:** Daily Treatment Record
  Milking and the sale of market cows will bring your Daily Treatment Record into use. Dairy producers that have accidently marketed milk or dairy beef with violative residues state that it is important to keep these records. Properly identify treated cows. Develop good habits to properly manage antibiotics.

- **Step 7:** Monthly Economic Comparison
  When do you “cull” a market cow from your herd? Every month you should review the investment you are making in each cow in the milking string. Compare your expenses by using the Daily Treatment Records.

- **Step 8:** Disposal
  Periodic review of drugs in storage will mean you occasionally throw away drugs which have expired. By recording your daily animal treatments and any discarded drugs, you create a paper trail of what has happened to all drugs purchased. This eight-step antibiotic management system may prevent you from incurring a costly and embarrassing antibiotic accident!
**Herd Health Plan**

The dairy industry’s commitment to antibiotic stewardship begins on the farm with coordinated animal health and care programs, including a Herd Health Plan developed in consultation with the Veterinarian of Record (VOR) and reviewed annually. Even with the best prevention programs, animals can become sick or injured, and prudent and responsible use of antimicrobials (including antibiotics) under veterinary supervision may be necessary to improve the health outcome of the animal.

**An effective written Herd Health Plan focuses on:**

- Disease and Injury
  - Prevention
  - Rapid diagnosis
  - Necessary treatment
- Animal Caretakers
  - Training
  - Defined responsibilities
- Annual Review
  - Timely updates

**Record Keeping, Protocol and Antibiotic Stewardship Templates**

Please visit www.nationaldairyfarm.com for free record keeping and drug management record forms:

- Veterinarian-Client-Patient Relationship (VCPR) Form
- Recommended or Approved Drug List
- Sample Animal Treatment Plan
- Beginning Drug Inventory
- Record of Drug Purchases
- Daily Treatment Record
- Drug Disposal Record
- Considerations for Culling Poster
- Draft Herd Health Plan

**Food Armor Foundation**

The Food Armor Foundation is a non-profit 501©3 organization with a passionate team of food industry professionals ranging from producers and veterinarians to packers, processors and food marketers. The beginnings of the program go back to 2010 in Wisconsin where, through education and a grass-roots approach, Food Armor was able to reduce an unacceptably high incidence of tissue residues to near zero levels, while gaining respect across the veterinary community, maintaining a broad stakeholder perspective (including veterinarians) and building years of experience in translating guidelines into education. Food Armor strives to provide a solid educational foundation for every food animal veterinarian signing a VCPR for a farming operation and is working together with industry leaders to strengthen the meaning of the VCPR. Food Armor’s online educational learning system is designed to provide every veterinarian with the knowledge and skills necessary to build a robust antimicrobial stewardship program, one farm at a time.
Injections should be given in the neck to prevent costly damage to economically important cuts of beef. This is particularly important when administering intramuscular (IM) products. It also makes it easier for packers to identify lesions at the plant level, so they do not inadvertently end up on a consumer’s plate. To lessen injection site defects, the preferred site for all injections has now been reduced to the smaller injection area of the neck region (Fig. 2). In the 2016 National Beef Quality Audit injection site lesions found in the rounds of dairy animals had fallen to 15 percent, compared to 60 percent in 1998.

Several animal health products are now approved for injection into the ear of cattle. This location is excellent from a quality assurance perspective as ears are removed at harvest and do not enter the food chain. Certain antibiotics are approved for the ear injection site. The exact location on the ear depends on the product. However, the route approved for lactating dairy cows is the base of the ear. The ear must be very clean, and care must be taken to avoid blood vessels. Read product labels carefully. An example of the base of ear (BOE) injection technique can be found at: https://www.zoetisus.com/products/beef/excede/dosing-administration.aspx.

**Types of Injections**

- **IM** – Intramuscular (Administered in the muscle)
- **IMM** – Intermammary (Administered in the udder and does not use needle)
- **IV** – Intravenous (Administered in the vein)
- **SQ** – Subcutaneous (Administered under the skin)
Whenever possible, choose products formulated and labeled for injection under the skin (subcutaneous/SQ) rather than intramuscular (IM).

**Figure 1: SQ Injection “Tent” Technique.** The “tent” technique ensures that the product is truly being administered in the subcutaneous region.

**Figure 2: IM Injection Zone.** To lessen injection site defects, the preferred injection site has been reduced to the smaller (dark red) injection area shown above — particularly with IM products. This has become necessary to ensure the quality of new value-added products from the chuck. Even in the absence of blemishes, case-ready packaging processes can cause discoloration of meat near an injection site.

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### ROUTE OF ADMINISTRATION VIA NEEDLE

<table>
<thead>
<tr>
<th>INJECTABLE VISCOSITY</th>
<th>SQ (1/2 - 3/4” Needle)</th>
<th>IV (1 1/2” Needle)</th>
<th>IM (1-1 1/2” Needle)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cattle Weight lbs.</strong></td>
<td>Cattle Weight lbs.</td>
<td>Cattle Weight lbs.</td>
<td></td>
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<tr>
<td>&lt;300</td>
<td>300 to 700</td>
<td>&gt;700</td>
<td></td>
</tr>
<tr>
<td>Thin (Example: Saline)</td>
<td>18 gauge 18-16 gauge 16 gauge 18-16 gauge 16 gauge 16-14 gauge 16-14 gauge 18 gauge 16 gauge 16 gauge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thick (Example: Tetracycline)</td>
<td>18-16 gauge 18-16 gauge 16 gauge 16-14 gauge 16-14 gauge 16-14 gauge 16 gauge</td>
<td></td>
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</tr>
</tbody>
</table>

Select the needle to **fit the cattle size** (the smallest practical size without bending)

Primary considerations in needle selection are:
- Route of administration
- Size of the animal
- Location or site of the injection

Secondary considerations include:
- Viscosity of the fluid (how thick and tenacious the fluid is)
- Volume injected
Drug Administration Best Practices

Cleaning Syringes and Needles
The use of disposable equipment is recommended and preferred. If reusable syringes, needles and other injection equipment are used, they should be heat-sterilized by boiling. If any disinfectants are used — including alcohol — they must be thoroughly rinsed from equipment because they neutralize vaccines and chemically react with some antibiotics.

Syringes should be thoroughly rinsed with sterile water before use. Sterile water can be purchased. Please note that distilled water is not sterile water. Consult your veterinarian before sterilizing equipment to ensure proper techniques. Improper sterilization can reduce the effectiveness of future injections and result in infection at the injection site. Do not contaminate modified live virus products with disinfectants as effectiveness will be decreased or even eliminated.

Needle Quality Control and Safety
Single-use needles are preferred to help prevent the spread of blood-borne diseases like Leukosis. This virus is a leading cause of carcass condemnation in slaughter facilities. At a minimum, be sure to change needles at a maximum of every 10 head to prevent using a dull needle. Change needles immediately if the needle bends. Do not straighten it or use it again. Obtain a new needle if the needle in use becomes contaminated with feces or an irritating chemical.

A broken needle is an emergency and time is of the essence. Broken needles migrate in tissue. If not immediately handled, they will be impossible to find — requiring the animal to be destroyed. Under no circumstances should animals with broken needles be sold or sent to a packer. If necessary, contact your veterinarian to assist in determining how animals will be handled should a needle break in the neck muscle.

Needle Storage and Disposal
Store used needles in a protected area using these disposal guidelines:

- Place in container with secure lid
- Place container in rigid container lined with plastic
- Dispose of as solid waste
When treating animals with any product take the following precautions:

- Read both the product label and insert and consult your veterinarian before administering drugs.
- Use a clean injection site and use a sterile needle for all injections.
- Use the labeled dosage and method of administration least likely to create a drug residue.
- Discard milk from all four quarters even when treating only one quarter with an IMM infusion.
- Milk treated cows last or use a segregated facility (divert milk from bulk tank or saleable milk).
- Thoroughly wash all equipment (inflations, hoses, weigh jars, etc.) that has come in contact with milk from treated cows.
- Make certain that any procedure used to divert milk from treated cows cannot accidentally send contaminated milk into the pipeline.
- Keep medicated feeds separated from non-medicated feeds.
- Ensure that calves fed antibiotic waste milk are not sent to slaughter until withdrawal times are met.
- Train employees on proper injection site selection.
- Clean transfer needles regularly to avoid contamination.
- Do not go back into the vaccine bottle with a needle once it has been used for anything else.
- When vaccinating groups, change needles frequently.
- When using killed vaccines, keep a saucer or sponge of alcohol or disinfectant nearby and wipe off the needle after each use. However, do not disinfect needles between injections when using a modified live vaccine, as the disinfectant can destroy the vaccine.
- Make sure the injection site is clean. Injecting into a wet or muddy site increases the risk for spreading disease and it increases the incidence of injection site lesions.

Drug Storage
It is in best practice to maintain complete control over the drug inventory on your dairy, limiting the access to drugs to authorized persons who are trained in proper drug use, and keep complete records of treatment.

Animal health products usually have specific storage requirements. All should be stored in a clean place where they cannot become dirty or contaminated. Observe and obey the manufacturer’s recommended storage instructions for each product. Where refrigeration is needed, be sure it is kept clean and located in a safe place — not likely to be overheated or contaminated by dirt or manure.

Animal health products should be stored away from feed ingredient or mixing areas unless regularly mixed feed additives. Storage of partially used medication or vaccine bottles is discouraged because they may become contaminated and could cause infections or tissue reactions if re-used. Please note, the Grade “A” Pasteurized Milk Ordinance requires that drugs intended for treatment of non-lactating dairy animals be segregated from those drugs used for lactating animals.

References
2017 Grade “A” Pasteurized Milk Ordinance
PMO - Drug Residue Testing and Farm Surveillance
https://www.fda.gov/media/114169/download

Chapter 4: Drug Administration
Culling of Animals

Please keep the following in mind when culling animals:

- Do not move non-ambulatory animals to market under any circumstances.
- Make the decision to treat, cull or to euthanize animals promptly. Sick and injured animals should be segregated from the herd.
- Delay transport of an animal that appears to be exhausted or dehydrated until the animal is rested, fed and rehydrated.
- Milk all cows that are still lactating just prior to transporting to a packing plant or a processing facility.
- Use a transportation company that is knowledgeable about your animal care expectations and provides for the safety and comfort of the animals during transport.
- Do not transport animals to a packing or processing facility until all proper treatment withdrawal times have been followed.
- Do not transport animals with a poor body condition, generally a Body Condition Score of less than 2 (1 - 5 scale).
- Do not transport heifers or cows where calving is imminent and likely to occur during the transportation or marketing process.
- Do not transport animals that require mechanical assistance to rise and walk, except to receive veterinary treatment. When using any handling device, abuse is never tolerated.
- Do not transport animals with bone fractures of the limbs or injuries to the spine. Animals with a recent fracture unrelated to mobility should be culled and transported directly to a packing or processing facility.

Culling sound animals reduces the chance that an animal will have drug residue remaining in its system. The risk of tissue residue violations should be minimized if treatment protocols and appropriate withdrawal times are carefully followed and approved animal drugs are used for the class of animal being treated. If treatment records are well maintained and proper doses, routes and frequencies of administration are heeded, the risk of violative tissue residues will be minimized.
Know Your Transporter
Residue issues associated with animals sent to slaughter might occur after the animal leaves the farm. Use a transportation company that is knowledgeable about your animal care expectations and provides for the safety and comfort of the animals during transport. Communicate with the hauler about where the animals are destined to go, especially when selling bull calves. If medicated milk replacers have been given, that animal should be withheld from sale, or the hauler should be clear that the animal has been treated and can affirm that the animal will not go to a terminal market. When not selling animals directly to a terminal market, sell your animals to intermediate owners who have instituted residue prevention programs consistent with those defined in this document. Be sure to document chain-of-custody as you may be held responsible for residues caused outside of your facility.

Veal and Bull Calves
For veal producers or dairy bull calves that may be marketed soon, use only products that are approved in pre-ruminant calves. Avoid any products with the statement “not for use in calves to be processed for veal.” Bob veal is the meat from young calves up to 150 pounds, typically marketed directly from a dairy farm. About 15 percent of all veal processed in

Veal Quality Assurance Program
The Veal Quality Assurance program is a collection of science-based best practices to ensure that veal calves receive quality care through every stage of life and are raised using production standards that result in a safe, wholesome, high quality product that meets regulatory and customer expectations. The success of all calves entering the veal market is highly dependent on early care at the dairy farm. The same principles of calf care used for dairy heifers should be applied to the care of bull calves, regardless if they are entering the beef or veal market. To learn more about the VQA program and access certification resources visit this website. https://www.vealfarm.com/certification-resources
the U.S. is bob veal. Bob veal is the second largest category of tissue residue violations in the U.S., after cull cows. Feeding medicated milk replacer or milk from treated cows may be a source of antibiotic residues in bob veal.

Even if you’re following all of the protocols to ensure calves taken from your dairy won’t have any tissue residues, additional safety measures can be taken. There seems to be a tattered history of bull calves being misidentified at slaughter. Properly identifying animals that leave the dairy strengthens documentation in our food chain.

Every calf should have a durable form of identification (e.g., ear tag) and a written bull calf sales log on your dairy should be used to prevent errors. A written log should include the following information for each calf leaving your dairy:

- Identification
- Date of transaction
- Signature of calf hauler
- Intent of hauling each calf (is it going to a calf ranch or to slaughter?)

Make sure you or one of your employees are present when the calf hauler picks up market calves. This is a crucial practice that is easily adopted with today’s modern technology. Also, consider collecting a receipt from the hauler. A receipt should include the following:

- Calf hauler business name
- Calf hauler license number
- Calf hauler’s name
- Calves received on that day
- Identification of each calf

Carefully manage details of your market animals. Even the slightest misstep in dairy management could cause residue violations and potentially damage your dairy’s reputation. Work with your veterinarian to help prevent residues in your young bull calves leaving your dairy.

References
Residue Testing

Tolerance Limits
The regulatory tolerances for milk and meat antibiotic residues vary depending on the type of drug used and route of administration. The withdrawal times and tolerances are only valid if a drug is used according to the label directions and in the class of animal listed on the label.

If a drug is used in a class of animal not on the label, then there is NO TOLERANCE established for that drug and any trace amount, even if it is below the target testing/tolerance level established for the labeled class, is a violation.

Drugs not approved for use in lactating dairy cattle do not have FDA-established tolerances for residues in milk. Further, the tissue tolerances for drugs approved for beef cattle do not apply to lactating dairy cattle. Extra-label drug use in unapproved classes of animals is discouraged and if used, must be prescribed by a veterinarian. A complete list of the tolerances can be found in the FDA Green Book, which lists all approved animal drugs. If you have questions or concerns about potential residues or withdrawal times, please contact your herd veterinarian.

References
FDA Green Book, for tissue residue thresholds
http://www.fda.gov/AnimalVeterinary/Products/ApprovedAnimalDrugProducts/

Malicious Contamination
Dairy producers should recognize and remember that drug residues in milk may occur because of intentional, malicious contamination. Ensure that your antibiotics are stored securely and monitor your farm for any suspicious activity.
Milk Drug Residue Testing

Pasteurized Milk Ordinance (PMO)
The Grade “A” Pasteurized Milk Ordinance (PMO), the rules that state regulatory agencies use to implement their Grade “A” milk programs, requires that all bulk milk tankers be sampled and analyzed for beta-lactam drug residues before the milk is processed. The PMO also requires states to test farm-level milk samples at least four times every six months for antibiotics (called Section 6 testing). Most states use an “inhibitor” test, which shows sensitivity to any antibiotic in milk. Additionally, customers (e.g., processors) may require additional testing for quality assurance purposes. Any tanker found positive for any antibiotic residue is rejected for human consumption.

In 1996, of the 3,384,779 bulk milk pick-up tankers tested, 0.104 percent tested positive (https://www.nmdrd.com/fy-96.pdf). Through increased education and industry advancements, of the 3,598,118 bulk milk pick-up tankers tested by industry and state regulatory agencies from October 2017 to September 2018, 0.010 percent tested positive for drug residues. This signifies a dramatic decrease from an already low level of occurrence (https://www.nmdrd.com/fy-18.pdf). See Figure 1.

PMO Antibiotic Testing Pilot Program
In 2015, the National Conference on Intestate Milk Shipments approved a pilot program for the routine testing of other antibiotics in addition to the required beta-lactam drug for testing. For 18 months, beginning July 1, 2017, and ending December 31, 2018, about 1 out of every 15 milk tank trucks was tested for the tetracycline family of drugs. FDA is now reviewing the results and will determine next steps, including the possibility of formalizing tetracycline testing requirements. Additionally, the pilot program may continue in the future with other drug families such as aminoglycosides (ex. gentamycin).

Multi-Drug Screening Test for Bulk Tank Milk
In 2010, the Food and Drug Administration developed a multi-class, multi-residue liquid chromatography/tandem mass spectrometry (LC-MS/MS) screening and confirmation method for drug residues in milk. The procedure is detailed in FDA Laboratory Information Bulletin #4443. The purpose of this method is to screen samples to determine if a residue is present at the level of interest (i.e., target testing/tolerance levels or established levels of detection) and also to confirm the identity of the compound. An exact quantitative determination of any residue is not addressed.
Meat Drug Residue Testing

The United States Department of Agriculture Food Safety Inspection Service (USDA FSIS) conducts tests for chemicals – including antibiotics and other drugs, pesticides and environmental chemicals – in meat, poultry and egg products destined for human consumption. USDA Food Safety and Inspection Service Annual Sampling Program Plan Fiscal year 2019 tests for these chemicals through a random sampling of tissue from healthy-appearing food animals. The development of the plan by USDA FSIS includes:

- Determining the compounds are of food safety concern
- Using algorithms to rank the selected compounds
- Pairing these compounds with appropriate production classes
- Establishing the number of samples to be collected

The USDA FSIS Hazard Analysis and Critical Control Point (HACCP) program implemented at slaughter facilities identifies the animals most likely to have drug residues. Animals that display lameness, injection site lesions or signs of illness are targeted for testing. See Considerations for Culling and Transporting Dairy Animals to Market, Page 25.

Factors that can contribute to higher risk of residues are found in Figure 2 on Page 20 and can be useful in assessing animals destined for slaughter. If there is any doubt about the potential for drug residues in an animal, it should be withheld from market. Each year, nearly 3 million adult dairy cows are slaughtered for beef. Of that amount, a very small percentage tests positive for a residue. USDA FSIS has reported a 24 percent decline in the number of tissue residues in market dairy cows during the most recent four years for which data has been released.

This method tests for the following drugs:

<table>
<thead>
<tr>
<th>Drug 1</th>
<th>Drug 2</th>
<th>Drug 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin</td>
<td>Penicillin G</td>
<td>Cloxacillin</td>
</tr>
<tr>
<td>Cepahirin</td>
<td>Sulfamethazine</td>
<td>Sulfadiazine</td>
</tr>
<tr>
<td>Sulfadimethoxine</td>
<td>Sulfathiazole</td>
<td>Sulfamethazine</td>
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<tr>
<td>Sulfapyridine</td>
<td>Sulfachloropyridazine</td>
<td>Sulfamethazine</td>
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<td>Oxytetracycline</td>
<td>Tetracycline</td>
<td>Chlortetracycline</td>
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<tr>
<td>Doxycycline</td>
<td>Tylosin</td>
<td>Tilmicosin</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>Sarafloxacin</td>
<td>Enrofloxacine</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>Flunixin</td>
<td>Bacitracin</td>
</tr>
<tr>
<td>Rhiabendazole</td>
<td>Virginiamycin</td>
<td>Rripelennamine</td>
</tr>
</tbody>
</table>

Some testing laboratories have modified this method to include additional drugs.
Conditions that Warrant Additional Testing at USDA Slaughter Facilities

The following list contains descriptions, directly from USDA documents, of conditions that may warrant testing of carcasses for drug residues:

**Mastitis** Signs of mastitis can vary based on the severity and duration of infection and may exhibit varying degrees of clinical signs, from pus-like or discolored discharge from the teats and redness and swelling of the udder, to no visible change in the udder.

**Metritis** USDA inspectors will look for this postmortem indication. Be mindful of sending animals to slaughter that show signs of metritis such as high fever, major drops in milk production, or eye or nasal discharge.

**Peritonitis and Surgery** Signs of recent surgical procedures or findings of surgical devices (e.g., suture, toggles, fistula devices) are only significant if they are associated with active peritoneal or subcutaneous inflammation.

**Injection Sites** Live animals and carcasses with lesions or abscesses associated with injections on any part of the animal are of potential concern.

**Other Disease Symptoms** Any signs of the following diseases or conditions can lead to an animal being tested for potential chemical residues or to determine fitness for harvest: depression, an elevated or subnormal body temperature, hyperemic skin, congested mucous membranes, dehydration, or poor body condition in association with an injury or inflammatory condition, such as abscesses, arthritis, pneumonia, mastitis, metritis or diamond skin.

**Signs of Treatment** Indicated by leakage around jugular veins, subcutaneously, intramuscularly or intraperitoneally, or clinical signs indicative of treatment by mouth, such as discoloration from particles found in any part of the digestive tract, are important signs when examining veal calves for testing. Additionally, inspectors are aware of common industry practices that could indicate an animal was recently treated. Dairy cows arriving for slaughter with fetlock or ankle bands indicate that the animal has previously received treatment for
a medical condition. When observed, inspectors are instructed to determine the appropriateness of additional testing or removal from the food supply.

**USDA FSIS Residue Repeat Violator Lists**
The USDA FSIS maintains a “Residue Repeat Violator List for Use by FSIS Inspection Personnel” that contains the names and addresses of producers who have more than one meat residue violation in a 12-month period in animals presented for slaughter. Specific information about the violation can also be found in this list, including the plant where the violation was determined, the drug residues identified and their concentrations and tolerances. Violators listed may have had multiple violations documented in the same processing facility or in separate facilities. This list is intended to aid inspectors in discovering residue tolerance violations before they reach consumers. The USDA FSIS provides a user guide that explains the information contained in the list.

The USDA FSIS also maintains a “Residue Repeat Violator List for Use by Livestock Markets and Establishments” that contains similar information intended to assist plant owners and operators in identifying residue history of livestock suppliers. This list documents only the source name and address information of repeat violators, so that livestock marketers and buyers may use precaution when marketing and processing animals from listed suppliers. The USDA FSIS provides a user guide that explains the information contained in the list.

**References**

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**Charm® Antibiotic and Aflatoxin Solutions:**
*Charm SL* Target Level: Detects beta-lactam drugs in 3 or 8 minutes
Charm SL Aflatoxin Tests: Detects aflatoxin in 3 minutes
*Charm TRIO* Test: Detects beta-lactam, tetracycline, and sulfonamide in a single test in 3 minutes
*Charm ROSA TET-SL: Detects tetracycline in 8 minutes
*Charm ROSA SULF Test: Detects 14 sulfa drugs in 8 minutes
Charm Gentamicin Test: Detects gentamicin in 3 minutes
Charm Florfenicol Test: Detects florfenicol in 8 minutes
Broad Spectrum Inhibition: CowSide® II test for beta-lactams, sulfonamide, aminoglycosides, and tetracycline is the most comprehensive inhibition test.

*NCIMS Approved

Contact us for all farm residue prevention needs.

659 Andover Street | Lawrence, MA 01843 | 1.978.687.9200 | info@charm.com | www.charm.com

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# Drug Classes

## Classes of Animal Drugs

<table>
<thead>
<tr>
<th></th>
<th>Over-the Counter (OTC)</th>
<th>Prescription (Rx)</th>
<th>Veterinary Feed Directive (VFD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Can be sold by any person or establishment without a veterinary prescription</td>
<td>Can only be sold to the producer by a veterinarian or pharmacist</td>
<td>A drug intended for use in or on feed, which is limited by an approved application to use under the professional supervision of a licensed veterinarian</td>
</tr>
</tbody>
</table>

### Pulmotil® (tilmicosin)

The first VFD product approved for use in cattle. The FDA approved the drug as a treatment for groups of beef and nonlactating dairy cattle in the early stages of a bovine respiratory disease outbreak to provide 14 days of sustained in-feed therapy.
Veterinarian Feed Directive (VFD)
In 2015, the FDA finalized the Veterinary Feed Directive (VFD) which mandates the rules and responsibilities of licensed veterinarians in prescribing and administering medically important antibiotics in feed or water. A licensed veterinarian must have an established Veterinarian-Client-Patient Relationship to prescribe a VFD drug. The final VFD rules also prohibit any “extra-label drug use” so a VFD prescription must conform exactly to the drug manufacturer’s label indications, including the specific disease or condition being treated.

There are no legal extra-label uses of VFD drugs.

There are no VFD drugs approved for use in lactating dairy cattle.

Medically important antibiotics subject to the VFD when administered in feed or water:

- Aminoglycosides
- Lincosamides
- Macrolides
- Penicillins
- Streptogramins
- Sulfonamides
- Tetracyclines

Ionophores, like monensin, are not affected by the guidance since they have no human medical relevance. Thus, the actions have no effect on the use of ionophore additives in lactating and dry cows or as coccidiostats in growing heifers.

References
CVM GFI #152 Evaluating the Safety of Antimicrobial New Animal Drugs with Regard to Their Microbiological Effects on Bacteria of Human Health Concern FDA Guidance for Industry #152

Drugs Not Approved for Use in Food-Producing Animals
The following drugs are not approved for use in any species of food-producing animal:

- Chloramphenicol
- Clenbuterol
- Diethylstilbestrol (DES)
- Dipyridamole
- Gentian violet
- Glycopeptides (example vancomycin)
- Nitrofurans (including topical use)
- Nitroimidazoles (including metronidazole)

Following a thorough literature review, the American Veterinary Medical Association (AVMA), the American Association of Bovine Practitioners (AABP) and the Academy of Veterinary Consultants (AVC) recommend that veterinarians refrain from using aminoglycosides (Amikacin, Gentamicin, Kanamycin and Neomycin) in cattle except where approved for use by the Food and Drug Administration, as these antibiotics can cause very prolonged tissue residues.

Extra Label Drug Use
“Federal law restricts this drug to use by or on the order of a licensed veterinarian.”

This statement is on every prescription drug sold. Any use of a drug not specifically listed on the label is called “extra-label drug use” and is regulated by the FDA under the Animal Medicinal Drug Use Clarification Act (AMDUCA) of 1994. Using a prescription or over-the-counter drug in an extra-label manner is illegal unless it is specifically prescribed with withdrawal times by a veterinarian working in the context of a Veterinarian-Client-Patient Relationship (VCPR). Any extra-label use of antibiotics must be used as a prescription and must include the written instructions for the specific lifecycle of animals to be treated, including dose, route of administration, frequency of use and withdrawal times for milk and/or meat. Extra-label use will generally require an extended withdrawal time. List of animal drugs prohibited for use in food...
animals including extra-label use can be found on Page 26.

Examples of extra-label drug use:

- Changing the dose, such as giving more penicillin than is listed on the label
- Changing the route of administration, such as giving flunixin intramuscularly (IM) or subcutaneously (SQ) instead of intravenously (IV)
- Giving a drug to a different production class of animal, such as using Nuflor® in a lactating dairy cow
- Giving a drug for an indication (disease) not listed on the label, such as using Excede® for diarrhea
- Changing the withholding times, such as not following milk withholding times for fresh cows after dry treatment administration
- Changing the amount of drug per injection site
- Changing the duration of therapy

**Indications for Euthanasia**

The following conditions or situations may lead to an animal being compromised to such an extent that euthanasia is indicated:

- Fracture, trauma or disease of the limbs, hips or spine resulting in immobility or inability to stand
- Loss of production and quality of life (advanced age, severe mastitis, etc.)
- Disease conditions for which no effective treatment is known (i.e. Johne’s disease, lymphoma)
- Diseases that involve a significant threat to human health (i.e. rabies)
- Advanced ocular neoplastic conditions (“cancer eye”)
- Disease conditions that produce a level of pain and distress that cannot be managed adequately
- Emaciation and/or debilitation from disease, age or injury that result in an animal being too compromised to be transported or marketed
- Disease conditions for which treatment is cost prohibitive
- Extended drug withdrawal time for clearance of tissue residue
- Poor prognosis or prolonged expected recovery

**Euthanasia Decision Making and Considerations**

Actions involving compromised cattle include treatment, slaughter or euthanasia. The following criteria should be considered when making a decision:

- Pain and distress of animal
- Likelihood of recovery
- Ability to get to feed and water
- Drug withdrawal time
- Economic considerations
- Condemnation potential
- Diagnostic information
Potential Residue Violations will likely occur from Extra-Label Drug Use when:

- ANY detectable level above zero (0) for a drug not approved for lactating dairy cattle.
- Current on-farm or bulk tank milk at a processing facility tests cannot detect levels low enough to assure the absence of residues.
- Animals that are sick or compromised may metabolize drugs at a slower rate than healthy animals, which may result in a significantly extended withdrawal time for both meat and milk.

Tips for ELDU Use in Dairy Cattle

- Always use drugs approved in the class of animal to which the drug is being administered as a first line of therapy.
- It is not responsible to give a drug with a high risk of residue to an animal that has a poor chance of recovery. Animals that are suffering and have a poor chance of recovery should be euthanized. Animals that are healthy enough for slaughter and are a poor candidate for treatment should be culled/marketed instead of being treated with an unapproved drug that has a higher risk of creating a milk/meat residue.
- Record all treatments in your treatment records and keep them for a minimum of two years.
- Regularly review treatment protocols and treatment records with the Veterinarian of Record (VOR).

The labeled withdrawal times do not apply to an unapproved production class. While FARAD (see Page 6) can provide withdrawal recommendations for ELDU, they generally do not have enough information to project a “zero detectable level,” particularly with the sensitivity of current testing methodologies. Veterinarians and cattle producers should exercise extreme caution using drugs not approved for that production class of animal and consider avoiding such use due to unknown withdrawal times.

Considerations for Culling and Transporting Dairy Animals to Market:

- Do not move non-ambulatory animals to market under any circumstances.
- Make the decision to treat, to cull, or to euthanize animals promptly. Sick and injured animals should be segregated from the herd.
- Delay transport of an animal that appears to be exhausted or dehydrated until the animal is rested, fed and rehydrated.
- Milk all cows that are still lactating just prior to transporting to a packing plant or a processing facility.
- Use a transportation company that is knowledgeable about your animal care expectations and provides for the safety and comfort of the animals during transport.
- Do not transport animals to a packing or processing facility until all proper treatment withdrawal times have been followed.
• Do not transport animals with a poor body condition, generally a Body Condition Score of less than 2 (1 – 5 scale).
• Do not transport heifers or cows where calving is imminent and likely to occur during the transportation or marketing process.
• Do not transport animals that require mechanical assistance to rise and walk, except to receive veterinary treatment. When using any handling device, abuse is never tolerated.
• Do not transport animals with bone fractures of the limbs or injuries to the spine. Animals with a recent fracture unrelated to mobility should be culled and transported directly to a packing or processing facility.
• Do not transport animals with conditions that will not pass pre-slaughter inspection at a packing or processing facility. If unsure, consult with your veterinarian before transporting an animal to a packing or processing facility.

Conditions that Will Not Pass Pre-slaughter Inspection

Dairy producers should not transport animals with conditions that are unlikely to pass pre-slaughter inspection.

These conditions include, but are not limited to:

• Cancer eye
• Blindness in both eyes
• Fever greater than 103°F
• Drug residues
• Peritonitis
• Fractures or lameness (3 on the NDFP scale)
• Unreduced prolapses
• Cows that are calving or have a high likelihood of calving during transport
• Distended udders causing pain and ambulatory issues
• Suspected central nervous system symptoms
• Visible open wounds

Drugs Prohibited from Extra-Label Use in Animals (21 CFR Sec. 530.41)5

21 CFR Section 530.41(a):

The following drugs, families of drugs and substances are prohibited for extra-label animal drug uses in food-producing animals.

• Chloramphenicol
• Clenbuterol
• Diethylstilbestrol (DES)
• Dimetridazole
• Ipronidazole
• Other nitroimidazoles
• Furazolidone
• Nitrofurazone
• Sulfonamide drugs in lactating dairy cattle (except approved use of sulfadimethoxine, sulfabromomethazine and sulfaethoxypyridazine)
• Fluoroquinolones (examples: ciprofloxin, enrofloxacin)
• Glycopeptides
• Phenylbutazone in female dairy cattle 20 months of age or older
• Cephalosporins (not including cephapirin) in cattle, swine, chickens or turkeys:
  - For disease prevention purposes;
  - At unapproved doses, frequencies, durations or routes of administration; or
  - If the drug is not approved for that species and production class.

The list table is subject to change. Consult the current version of 21 CFR Sec. 530.41 for the most up-to-date list.

References

Food and Drug Administration. April 1, 2018.
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/cfrsearch.cfm?fr=530.41
Cephalosporin Extra-Label Use Prohibitions

The U.S. Food and Drug Administration Order of Prohibition of Cephalosporins became effective in 2012. The FDA order prohibits certain “extra-label” or unapproved uses of the cephalosporin (excluding cephapirin) class of antimicrobial drugs in cattle, swine, chickens and turkeys.

Prohibited uses in dairy animals include:

- Using cephalosporin drugs at unapproved dose levels, frequencies, durations or routes of administration
- Using cephalosporin drugs in cattle that are not approved for use in that species (e.g., cephalosporin drugs intended for humans, companion animals or a different species or class of food animal)
- Using cephalosporin drugs for disease prevention

Exceptions to the prohibition:

- Extra-label use of approved cephapirin products in food-producing animals
- Use to treat or control an extra-label disease indication, as long as this use adheres to a labeled dosage regimen (i.e., dose, route, frequency and duration of administration) approved for that particular species and production class
- Extra-label use in food-producing minor species, such as sheep, goats, ducks or rabbits
- Cephapirin Cephapirin drug products are excluded from the prohibition order. Cephapirin is currently only approved for use in food-producing animals as an intramammary infusion formulation for dairy cattle and there are currently no approved cephapirin drug products approved for use in humans. All cephapirin given to dairy animals must be used for specific disease indications according to label recommendations and withdrawal periods. In dairy animals, cephalosporins can be used in an extra-label manner only for disease indication and only under the recommendation of a veterinarian for which the farm has a current VCPR. Any use of cephapirin in a manner not listed on the label without a VCPR is illegal.

Examples

Cephapirin
(Tomorrow Infusion, Today®)

Ceftiofur
(EXCEDE®, EXCENEL® RTU EZ, Naxcel® Sterile Powder, SPECTRAMAST™ DC, SPECTRAMAST™ LC)
NMPF does not endorse any of the veterinary drugs or tests identified on the lists in this manual. The lists of veterinary drugs and tests are provided only to inform producers what products may be available. The producer is responsible for determining whether to use any of the veterinary drugs or tests. All information regarding the veterinary drugs or tests was obtained from the products’ manufacturers or sponsors, and NMPF has made no further attempt to validate or corroborate any of that information. NMPF urges producers to consult with their veterinarians before using any veterinary drug or test, including any of the products identified on the lists in this manual. Data provided by the manufacturer or marketer is current as of January 2019. Veterinarians needing extra-label information should consult the FDA Green Book or contact the Food Animal Residue Avoidance Databank (FARAD) at 888-873-2723 or www.FARAD.org.
**FDA-Approved Drugs for Injectable Use**

**Non-Lactating Cattle**

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Drug Type</th>
<th>Meat Withholding Time</th>
<th>Product Name</th>
<th>Manufacturer/Marketer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin trihydrate</td>
<td>Rx</td>
<td>6 days</td>
<td>Polyclix®</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td>Ceftiofur crystalline free acid</td>
<td>Rx</td>
<td>13 days</td>
<td>EXCEDE®</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Ceftiofur hydrochloride</td>
<td>Rx</td>
<td>4 days</td>
<td>EXCENEL® RTU EZ</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Ceftiofur sodium</td>
<td>Rx</td>
<td>4 days</td>
<td>Naxcel® Sterile Powder</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Cloprostenol sodium</td>
<td>Rx</td>
<td>None</td>
<td>Estrumate®</td>
<td>Merck Animal Health</td>
</tr>
<tr>
<td>Dinoprost tromethamine</td>
<td>Rx</td>
<td>None</td>
<td>Lutalyse® Sterile Solution</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>None</td>
<td>Prostamate®</td>
<td>Bayer HealthCare LLC, Animal Health</td>
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<tr>
<td>Doramectin</td>
<td>OTC</td>
<td>35 days</td>
<td>Dectomax® Injectable</td>
<td>Zoetis, Inc.</td>
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<td>Enrofloxacin</td>
<td>Rx</td>
<td>28 Days</td>
<td>Baytril® 100</td>
<td>Bayer HealthCare LLC, Animal Health</td>
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<tr>
<td></td>
<td>Rx</td>
<td>28 Days</td>
<td>Enroflox® 100</td>
<td>Norbrook Laboratories, Ltd.</td>
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<tr>
<td>Erythromycin</td>
<td>Rx</td>
<td>21 days</td>
<td>Gallimycin-100</td>
<td>Bimeda, Inc.</td>
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<td>Florfenicol</td>
<td>Rx</td>
<td>28 or 33 days** (See label)</td>
<td>Norfenicol®</td>
<td>Norbrook Laboratories, Ltd.</td>
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<tr>
<td></td>
<td>Rx</td>
<td>28 or 38 days** (See label)</td>
<td>Nuflor® Injectable Solution</td>
<td>Merck Animal Health</td>
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<tr>
<td>Florfenicol and Flunixin meglumine</td>
<td>Rx</td>
<td>38 days</td>
<td>Resflor Gold®</td>
<td>Merck Animal Health</td>
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<tr>
<td>Flunixin meglumine</td>
<td>Rx</td>
<td>4 days</td>
<td>Banamine®</td>
<td>Merck Animal Health</td>
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<td>MWI Veterinary Supply</td>
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<td></td>
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<td>4 days</td>
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<td>Aspen Veterinary Resources</td>
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<tr>
<td>Gamithromycin</td>
<td>Rx</td>
<td>35 days</td>
<td>Zactran</td>
<td>Merial, Inc.</td>
</tr>
<tr>
<td>Gonadorelin diacetate tetrahydrate</td>
<td>Rx</td>
<td>None</td>
<td>Cystorelin</td>
<td>Merial, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>None</td>
<td>Fertagyl®</td>
<td>Merck Animal Health</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>None</td>
<td>OvaCyst®</td>
<td>Bayer HealthCare LLC, Animal Health</td>
</tr>
<tr>
<td>Gonadorelin hydrochloride</td>
<td>Rx</td>
<td>None</td>
<td>Factrel®</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Gonadotropin (chorionic)</td>
<td>Rx</td>
<td>None</td>
<td>Chorulon®</td>
<td>Merck Animal Health</td>
</tr>
<tr>
<td>Isoflupredone acetate</td>
<td>Rx</td>
<td>7 days</td>
<td>Predef® 2x</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Ivermectin*</td>
<td>OTC</td>
<td>35 days</td>
<td>Agrimectin 1% Injectable</td>
<td>Agri Laboratories, Ltd.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>35 days</td>
<td>Ivermax®</td>
<td>Aspen Veterinary Resources</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>35 days</td>
<td>IVOMEC 1% Injection for Cattle</td>
<td>Merial, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>35 days</td>
<td>Noromectin® Injection for Cattle and Swine</td>
<td>Norbrook Laboratories, Ltd.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>35 days</td>
<td>Vetriamec™ 1%</td>
<td>MWI Veterinary Supply</td>
</tr>
</tbody>
</table>

**Notes:**
- **The term non-lactating cattle is defined as dairy bulls, dairy calves, and replacement heifers. Read label indications carefully. Some products are not approved for non-ruminating calves and female dairy cattle 20 months of age and older. Some products cannot be used with veal calves. Carefully consult the labels.**
- **Withholding times depend upon labeled dosage used.**
- **Ivermectin is not approved for female dairy cattle of breeding age.**

---

*Chapter 8: Approved Drugs and Screening Tests*
### FDA-Approved Drugs for Injectable Use

#### Non-Lactating Cattle** (continued)

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Drug Type</th>
<th>Meat Withholding Time</th>
<th>Product Name</th>
<th>Manufacturer/Marketer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ivermectin/Clorsulon*</td>
<td>OTC</td>
<td>49 days</td>
<td>Agrimectin plus Clorsulon</td>
<td>Agri Laboratories, Ltd.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>21 days</td>
<td>Ivermax® Plus</td>
<td>Aspen Veterinary Resources</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>49 days</td>
<td>IVOMEC Plus Injection for Cattle</td>
<td>Merial, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>21 days</td>
<td>Noromectin® Plus Injection</td>
<td>Norbrook Laboratories, Ltd.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>35 days</td>
<td>Vetrimec™ Plus</td>
<td>MWI Veterinary Supply</td>
</tr>
<tr>
<td><strong>The term non-lactating cattle is defined as dairy bulls, dairy calves, and replacement heifers. Read label indications carefully. Some products are not approved for non-ruminating calves and female dairy cattle 20 months of age and older. Some products cannot be used with veal calves. Carefully consult the labels.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Do not use within 4 weeks (28 days) of calving.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxytetracycline</td>
<td>Rx</td>
<td>28 days</td>
<td>300 PRO® LA</td>
<td>Norbrook Laboratories, Ltd.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>28 days</td>
<td>Agrimicin 200</td>
<td>Agri Laboratories, Ltd.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>28 days</td>
<td>Bio-Mycin® 200</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>28 days</td>
<td>Duramycin 72-200</td>
<td>Durvet, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>28 days</td>
<td>Liquamycin® LA200-*</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>28 days</td>
<td>Noromycin® 300 LA</td>
<td>Norbrook Laboratories, Ltd.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>28 days</td>
<td>Oxytetracycline Injection 200</td>
<td>Norbrook Laboratories, Ltd.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>28 days</td>
<td>Terra-Vet™ 200 Injection</td>
<td>Aspen Veterinary Resources</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>28 days</td>
<td>Tetroxy LA</td>
<td>Bimeda, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>28 days</td>
<td>Tetroxy LA</td>
<td>Bimeda, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>28 days</td>
<td>Vetrimec™ 200</td>
<td>MWI Veterinary Supply</td>
</tr>
<tr>
<td>Oxytetracycline hydrochloride</td>
<td>Rx</td>
<td>18 days</td>
<td>Bio-Mycin® C</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>22 days</td>
<td>Duramycin-100</td>
<td>Durvet, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>18 days</td>
<td>Oxy-Tet™ 100</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>22 days</td>
<td>Oxytet 100</td>
<td>Norbrook Laboratories, Ltd.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>22 days</td>
<td>Terra-Vet™ 100</td>
<td>Aspen Veterinary Resources</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>22 days</td>
<td>Vetrimec™ 100</td>
<td>MWI Veterinary Supply</td>
</tr>
<tr>
<td>Pegbovigrastim injection</td>
<td>Rx</td>
<td>None</td>
<td>Imrestor™</td>
<td>Elanco Animal Health</td>
</tr>
<tr>
<td>Penicillin G (benzathine)</td>
<td>OTC</td>
<td>30 days</td>
<td>Combi-Pen™-48</td>
<td>Bimeda, Inc.</td>
</tr>
<tr>
<td>Penicillin G (procaine)</td>
<td>OTC</td>
<td>14 days</td>
<td>Agricillin®</td>
<td>Agri Laboratories, Ltd.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>14 days</td>
<td>Bactracillin G*</td>
<td>Aspen Veterinary Resources</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>14 days</td>
<td>Norocillin</td>
<td>Norbrook Laboratories, Ltd.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>14 days</td>
<td>Penicillin Injectable</td>
<td>Durvet, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>14 days</td>
<td>PenOne Pro™</td>
<td>MWI Veterinary Supply</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>4 days</td>
<td>Pro-Pen-G™ Injection</td>
<td>Bimeda, Inc.</td>
</tr>
<tr>
<td>Selenium (sodium selenite)</td>
<td>Rx</td>
<td>30 days</td>
<td>BO-SE</td>
<td>Merck Animal Health</td>
</tr>
<tr>
<td>Sulfachlorpyridazine (sodium)</td>
<td>OTC</td>
<td>5 days</td>
<td>Vetisulid Injection</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td>Sulfadimethoxine</td>
<td>Rx</td>
<td>5 days</td>
<td>Di-Methox Injection 40%</td>
<td>Agri Laboratories, Ltd.</td>
</tr>
</tbody>
</table>
### FDA-Approved Drugs for Injectable Use

**Non-Lactating Cattle**

### Active Ingredient | Drug Type | Meat Withholding Time | Product Name | Manufacturer/Marketer
--- | --- | --- | --- | ---
Tilidipirosin | Rx | 21 days | Zuprevo 18%® | Merck Animal Health
Tilmicosin phosphate* | Rx | 42 days | Micotil Injection | Elanco Animal Health
Tripelemamine HCL | Rx | 4 days | Recovr Injectable | Kinetic Technologies
Tulathromycin | Rx | 22 days | DRAXXIN 25™ | Zoetis, Inc.
Tulathromycin | Rx | 18 days | DRAXXIN™ | Zoetis, Inc.
Tylosin | OTC | 21 days | Tylan Injection 50/200 | Elanco Animal Health
| OTC | 21 days | Tylosin Injection | Boehringer Ingelheim Vetmedica, Inc.
Vitamin E | Rx | 30 days | BO-SE | Merck Animal Health
| Rx | None | Vital E | Merck Animal Health
| OTC | None | Vitamin E 300 | Agri Laboratories, Ltd.

---

### FDA-Approved Drugs for Intramammary Use

**Non-Lactating Cattle**

### Active Ingredient | Drug Type | Milk Withholding Time | Meat Withholding Time | Product Name | Manufacturer/Marketer
--- | --- | --- | --- | --- | ---
Ceftiofur hydrochloride | Rx | None* | 16 days | SPECTRAMAST™ DC | Zoetis, Inc.
Cephapirin (benzathine) | OTC | 72 hours | 42 days | Tomorrow Infusion | Boehringer Ingelheim Vetmedica, Inc.
Cloxacillin (benzathine) | Rx | None | 30 days | Dry-Clox® | Boehringer Ingelheim Vetmedica, Inc.
| | | None* | 28 days | Orbenin®-DC | Merck Animal Health
Penicillin G (procaine) / dihydrostreptomycin | Rx | 96 hours post-calving | 60 days | Quartermaster® Dry Cow | Treatment West Agro Inc.
Penicillin G (procaine) / Novobiocin | OTC | 72 hours post-calving | 30 days | AlbaDry® Plus Suspension | Zoetis, Inc.
<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Drug Type</th>
<th>Meat Withholding Time</th>
<th>Product Name</th>
<th>Manufacturer/Marketer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albendazole</td>
<td>OTC</td>
<td>27 days</td>
<td>Valbazen® Suspension</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Amprolium</td>
<td>OTC</td>
<td>1 day</td>
<td>CORID 20% Powder</td>
<td>Merial, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>1 day</td>
<td>CORID 9.6% Oral Solution</td>
<td>Merial, Inc.</td>
</tr>
<tr>
<td>Chlortetracycline hydrochloride</td>
<td>Rx</td>
<td>1 day</td>
<td>Chlortetracycline Soluble Powder Concentrate</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>1 day</td>
<td>Pennchlor 64 Soluble Powder</td>
<td>Pharmgate Animal Health LLC</td>
</tr>
<tr>
<td>Citric acid</td>
<td>OTC</td>
<td>None</td>
<td>Re-Sorb® Powder</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Decoquinate</td>
<td>OTC</td>
<td>None</td>
<td>Deccox-M</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Dextrose</td>
<td>OTC</td>
<td>None</td>
<td>Re-Sorb® Powder</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Fenbendazole</td>
<td>Rx</td>
<td>8 days</td>
<td>Panacur 10% Suspension</td>
<td>Merck Animal Health</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>8 days</td>
<td>Safe-Guard 10% Paste</td>
<td>Merck Animal Health</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>8 days</td>
<td>Safe-Guard 10% Suspension</td>
<td>Merck Animal Health</td>
</tr>
<tr>
<td>Glycine</td>
<td>OTC</td>
<td>None</td>
<td>Re-Sorb® Powder</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Lasalocid</td>
<td>OTC</td>
<td>None</td>
<td>Crystalyx® Iono-Lyx® B300</td>
<td>Ridley Block Operations</td>
</tr>
<tr>
<td>Levamisole hydrochloride</td>
<td>OTC</td>
<td>2 days</td>
<td>Prohibit Soluble Drench Powder</td>
<td>Agri Laboratories, Ltd.</td>
</tr>
<tr>
<td>Monensin (sodium)</td>
<td>OTC</td>
<td>None</td>
<td>Rumenin 90</td>
<td>Elanco Animal Health</td>
</tr>
<tr>
<td>Neomycin sulfate</td>
<td>Rx</td>
<td>1 day</td>
<td>Biosol® Liquid</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>1 day</td>
<td>Neo-Sol 50</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>1 day</td>
<td>NeoMed 325 Soluble Powder</td>
<td>Bimeda, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>1 day</td>
<td>Neomix® 325</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>1 day</td>
<td>Neomix® Ag 325</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Oxfendazole</td>
<td>OTC</td>
<td>7 days</td>
<td>Synanthic® Bovine Dewormer Suspensions, 22.5 % and 9.06%</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td>Oxytetracycline dihydrate</td>
<td>Rx</td>
<td>5 days</td>
<td>Pennox 343 Soluble Powder</td>
<td>Pharmgate Animal Health LLC</td>
</tr>
<tr>
<td>Oxytetracycline hydrochloride</td>
<td>Rx</td>
<td>None</td>
<td>Oxy 500 Calf Bolus and Oxy 1000 Calf Bolus</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>5 days</td>
<td>Terramycin® 343 Soluble Powder</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>7 days</td>
<td>Terramycin® Scours Tablets</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>5 days</td>
<td>Terramycin® Soluble Powder</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Potassium citrate</td>
<td>OTC</td>
<td>None</td>
<td>Re-Sorb® Powder</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Potassium dihydrogen phosphate</td>
<td>OTC</td>
<td>None</td>
<td>Re-Sorb® Powder</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Sodium chloride</td>
<td>OTC</td>
<td>None</td>
<td>Re-Sorb® Powder</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Streptomycin sulfate</td>
<td>OTC</td>
<td>2 days</td>
<td>Strep Sol 29%</td>
<td>Huvepharma</td>
</tr>
<tr>
<td>Sulfachlorpyridazine (sodium)</td>
<td>Rx</td>
<td>7 days</td>
<td>Vetsulid® Powder</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td>Sulfadimethoxine</td>
<td>Rx</td>
<td>7 days</td>
<td>Albon® Concentrated Solution %12.5</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>12 days</td>
<td>Albon® S.R. (Sustained Release Bolus)</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>7 days</td>
<td>Di-Methox 12.5% Oral Solution</td>
<td>Agri Laboratories, Ltd.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>7 days</td>
<td>Di-Methox Soluble Powder</td>
<td>Agri Laboratories, Ltd.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>7 days</td>
<td>Sulfam-G</td>
<td>Bimeda, Inc.</td>
</tr>
<tr>
<td>Sulfamethazine</td>
<td>Rx</td>
<td>10 days</td>
<td>Sulmet® Oblets</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>12 days</td>
<td>Sustain III - Calf</td>
<td>Bimeda, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>12 days</td>
<td>Sustain III - Cattle</td>
<td>Bimeda, Inc.</td>
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</table>
### FDA-Approved Drugs for Oral Use

#### Non-Lactating Cattle** (continued)

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Drug Type</th>
<th>Meat Withholding Time</th>
<th>Product Name</th>
<th>Manufacturer/Marketer</th>
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</thead>
<tbody>
<tr>
<td>Sulfamethazine (sodium)</td>
<td>Rx</td>
<td>10 days</td>
<td>SMZ-Med</td>
<td>Bivona International, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>10 days</td>
<td>Sulmet® Drinking Water Solution</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>10 days</td>
<td>Sulmet® Soluble Powder</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td>Sulfadimethoxine</td>
<td>Rx</td>
<td>7 days</td>
<td>Di-Methox Soluble Powder</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td>Sulfachlorpyridazine (sodium)</td>
<td>Rx</td>
<td>7 days</td>
<td>Tetra-Bac 324</td>
<td>Agri Laboratories, Ltd.</td>
</tr>
<tr>
<td>Streptomycin sulfate</td>
<td>OTC</td>
<td>None</td>
<td>Terramycin® Ophthalmic Ointment</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Sodium chloride</td>
<td>OTC</td>
<td>None</td>
<td>Polyotic® Ophthalmic Ointment</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Potassium dihydrogen phosphate</td>
<td>OTC</td>
<td>None</td>
<td>Polyotic® Soluble Powder Concentrate</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Fenbendazole</td>
<td>Rx</td>
<td>8 days</td>
<td>Tet-Sol 324</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Dextrose</td>
<td>OTC</td>
<td>None</td>
<td>Tet-Sol 10</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Decoquinate</td>
<td>OTC</td>
<td>None</td>
<td>Tet-Sol 12</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Chlortetracycline hydrochloride</td>
<td>Rx</td>
<td>7 days</td>
<td>Tet-Sol 12</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Amprolium</td>
<td>OTC</td>
<td>None</td>
<td>Tet-Sol 12</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Albendazole</td>
<td>OTC</td>
<td>None</td>
<td>Tet-Sol 12</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Active Ingredient Drug Type</td>
<td>Meats Withholding Time</td>
<td>Product Name</td>
<td>Manufacturer/Marketer</td>
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</tr>
<tr>
<td>Sulfamethazine (sodium)</td>
<td>Rx</td>
<td>10 days</td>
<td>SMZ-Med</td>
<td>Bivona International, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>10 days</td>
<td>Sulmet® Drinking Water Solution</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td></td>
<td>Rx</td>
<td>10 days</td>
<td>Sulmet® Soluble Powder</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td>Sulfadimethoxine</td>
<td>Rx</td>
<td>7 days</td>
<td>Di-Methox Soluble Powder</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td>Sulfachlorpyridazine (sodium)</td>
<td>Rx</td>
<td>7 days</td>
<td>Tetra-Bac 324</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td>Streptomycin sulfate</td>
<td>OTC</td>
<td>None</td>
<td>Terramycin® Ophthalmic Ointment</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Sodium chloride</td>
<td>OTC</td>
<td>None</td>
<td>Polyotic® Ophthalmic Ointment</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Potassium dihydrogen phosphate</td>
<td>OTC</td>
<td>None</td>
<td>Polyotic® Soluble Powder Concentrate</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Fenbendazole</td>
<td>Rx</td>
<td>8 days</td>
<td>Tet-Sol 324</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Dextrose</td>
<td>OTC</td>
<td>None</td>
<td>Tet-Sol 10</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Decoquinate</td>
<td>OTC</td>
<td>None</td>
<td>Tet-Sol 12</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Chlortetracycline hydrochloride</td>
<td>Rx</td>
<td>7 days</td>
<td>Tet-Sol 12</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Amprolium</td>
<td>OTC</td>
<td>None</td>
<td>Tet-Sol 12</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Albendazole</td>
<td>OTC</td>
<td>None</td>
<td>Tet-Sol 12</td>
<td>Zoetis, Inc.</td>
</tr>
</tbody>
</table>

** The term non-lactating cattle is defined as dairy bulls, dairy calves, and replacement heifers. Read label indications carefully. Some products are not approved for non-ruminating calves and female dairy cattle 20 months of age and older. Some products cannot be used with veal calves. Carefully consult the labels.

---

### FDA-Approved Drugs for Topical Use

#### Non-Lactating Cattle**

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Drug Type</th>
<th>Meats Withholding Time</th>
<th>Product Name</th>
<th>Manufacturer/Marketer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doramectin</td>
<td>OTC</td>
<td>45 days</td>
<td>Dectomax® Pour-On</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Eprinomectin</td>
<td>OTC</td>
<td>None</td>
<td>EPRINEX Pour-On for Beef and Dairy Cattle</td>
<td>Merial, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>None</td>
<td>Eprinex® Pour-On for Beef and Dairy Cattle</td>
<td>Merial, Inc.</td>
</tr>
<tr>
<td>Ivermectin*</td>
<td>OTC</td>
<td>48 days</td>
<td>Agri-Mectin® Pour-On</td>
<td>Agri Laboratories, Ltd.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>48 days</td>
<td>Ivermax® Pour-On</td>
<td>Aspen Veterinary Resources</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>48 days</td>
<td>Ivermectin Pour-On</td>
<td>Durvet, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>48 days</td>
<td>IVOMEC (Ivermectin) Pour-On</td>
<td>Merial, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>48 days</td>
<td>Noromectin® Pour-On</td>
<td>Merial, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>48 days</td>
<td>Vetrimec™ Pour-On</td>
<td>Merial, Inc.</td>
</tr>
<tr>
<td>Moxidectin</td>
<td>OTC</td>
<td>None</td>
<td>Cydectin® (moxidectin) %0.5 Pour-On for Cattle</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td>Oxytetracycline hydrochloride / Polymyxin B sulfate</td>
<td>Rx</td>
<td>None</td>
<td>Terramycin® Ophthalmic Ointment with Polymyxin</td>
<td>Zoetis, Inc.</td>
</tr>
</tbody>
</table>

** The term non-lactating cattle is defined as dairy bulls, dairy calves, and replacement heifers. Read label indications carefully. Some products are not approved for non-ruminating calves and female dairy cattle 20 months of age and older. Some products cannot be used with veal calves. Carefully consult the labels.

*** Not for use in female dairy cattle 20 months of age or older.
## FDA-Approved Drugs for Feed Additive Use
### Non-Lactating Cattle**

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Drug Type</th>
<th>Meat Withholding Time</th>
<th>Product Name</th>
<th>Manufacturer/Marketer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amprolium</td>
<td>OTC</td>
<td>24 hours</td>
<td>Corid 1.25% Type C</td>
<td>Merial, Inc.</td>
</tr>
<tr>
<td>Bacitracin zinc</td>
<td>OTC</td>
<td>None</td>
<td>Baciferm</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Chlortetracycline</td>
<td>VFD</td>
<td>None</td>
<td>Aureomycin G</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Chlortetracycline</td>
<td>VFD</td>
<td>1 day</td>
<td>ChlorMax 50</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Chlortetracycline calcium</td>
<td>VFD</td>
<td>None</td>
<td>Pennchlor™</td>
<td>Pharmgate Animal Health LLC</td>
</tr>
<tr>
<td>Chlortetracycline hydrochloride</td>
<td>VFD</td>
<td>0-10 days**</td>
<td>CLTC 100 MR</td>
<td>Phibro Animal Health</td>
</tr>
<tr>
<td>Decoquinate</td>
<td>OTC</td>
<td>None</td>
<td>Deccox</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Fenbendazole</td>
<td>OTC</td>
<td>13 days</td>
<td>Safe-Guard 0.5% Top Dress Pellets</td>
<td>Merck Animal Health</td>
</tr>
<tr>
<td>Lasalocid</td>
<td>OTC</td>
<td>None</td>
<td>Bovatec Premix™</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Monensin (sodium)</td>
<td>OTC</td>
<td>None</td>
<td>Rumensin 90</td>
<td>Elanco Animal Health</td>
</tr>
<tr>
<td>Morantel tartrate</td>
<td>OTC</td>
<td>14 days</td>
<td>Rumelt® 88</td>
<td>Phibro Animal Health</td>
</tr>
<tr>
<td>Neomycin sulfate</td>
<td>VFD</td>
<td>1 day</td>
<td>Neomix Ag® 325 Medicated Premix</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Neomycin-oxytetracycline</td>
<td>VFD</td>
<td>0-30 days**</td>
<td>Neo-Oxy 100/100</td>
<td>Pharmgate Animal Health LLC</td>
</tr>
<tr>
<td>Neotetrazycline (quaternary salt)</td>
<td>VFD</td>
<td>0-5 days**</td>
<td>Pennox™</td>
<td>Pharmgate Animal Health LLC</td>
</tr>
<tr>
<td>Oxytetracycline</td>
<td>VFD</td>
<td>None</td>
<td>Terramycin® 100</td>
<td>Phibro Animal Health</td>
</tr>
<tr>
<td>Poloxalene</td>
<td>OTC</td>
<td>None</td>
<td>Bloat Guard® Liquid Type A Medicated Article</td>
<td>Phibro Animal Health</td>
</tr>
<tr>
<td>Virginiamycin</td>
<td>VFD</td>
<td>None</td>
<td>V-Max™</td>
<td>Phibro Animal Health</td>
</tr>
</tbody>
</table>

** The term non-lactating cattle is defined as dairy bulls, dairy calves, and replacement heifers. Read label indications carefully. Some products are not approved for non-ruminating calves and female dairy cattle 20 months of age and older. Some products cannot be used with veal calves. Carefully consult the labels.

## Approved Drugs and Screening Tests

**## Withholding times depend upon labeled dosage used.

* Ivermectin is not approved for female dairy cattle of breeding age.
## FDA-Approved Drugs for Feed Additive Use

*Non-Lactating Cattle*

Withholding times depend upon labeled dosage used.

*Neomycin sulfate

VFD 1 day

VFD

*Chlortetracycline hydrochloride

Morantel tartrate

OTC

*Chlortetracycline calcium

Monensin (sodium) OTC

Chlortetracycline

Lasalocid

OTC

*OTC

Bacitracin zinc

Virginiamycin

Fenbendazole OTC

Amprolium OTC

Poloxalene OTC

Oxytetracycline dihydrate

VFD None

Oxytetracycline (quaternary salt)

OTC

Decoquinate

Active Ingredient | Drug Type | Milk Withholding Time | Meat Withholding Time | Product Name | Manufacturer/Marketer
---|---|---|---|---|---
Ampicillin trihydrate | Rx | 48 hours | 6 days | Polyflex® | Boehringer Ingelheim Vetmedica, Inc.
Ceftiofur crystalline-free acid | Rx | None | 13 days | EXCEDE® | Zoetis, Inc.
Ceftiofur hydrochloride | Rx | None | 4 days | EXCENEL® RTU EZ | Zoetis, Inc.
Ceftiofur sodium | Rx | None | 4 days | Naixe® Sterile Powder | Zoetis, Inc.
Cloprostenol sodium | Rx | None | None | Estramate | Merck Animal Health
Dexamethasone | Rx | None | None | Dexamethasone Solution | Phoenix/Clipper Distributing Co., LLC
Dinoprost tromethamine | Rx | None | None | Lutalyse® HighCon Injection | Zoetis, Inc.
Flunixin meglumine | Rx | 36 hours | 4 days | Banamine® | Merck Animal Health
Gonadorelin diacetate tetrahydrate | Rx | None | None | Cystorelin Injectable | Merial, Inc.
Gonadorelin hydrochloride | Rx | None | None | Fertagyl® | Merck Animal Health
Gonadotropin (chorionic) | Rx | None | None | OvaCyst® | Bayer HealthCare LLC, Animal Health
Isosulfatedione acetate | Rx | None | None | Factrel® | Zoetis, Inc.
Oxytetracycline | OTC | 96 hours | 28 days | Agrimycin 200 | Agri Laboratories, Ltd.
Oxytetracycline | OTC | 96 hours | 28 days | Bio-Mycin® 200 | Boehringer Ingelheim Vetmedica, Inc.
Oxytetracycline | OTC | 96 hours | 28 days | Duramycin 72-200 | Durvet, Inc.
Oxytetracycline | OTC | 96 hours | 28 days | Liquamycin® LA-200® | Zoetis, Inc.
Oxytetracycline | OTC | 96 hours | 28 days | Oxytetracycline Injection 200 | Norbrook Laboratories, Ltd.
Oxytetracycline | OTC | 96 hours | 28 days | Terra-Vet™ 200 Injection | Aspen Veterinary Resources
Oxytetracycline | OTC | 96 hours | 28 days | Vetrimecin™ 200 | MWI Veterinary Supply
Oxytocin | Rx | None | None | Oxytocin Injection | Bimeda, Inc.
Pegbovigrastim injection | Rx | None | None | Imrestor™ | Elanco Animal Health
Penicillin G (procaine) | OTC | 48 hours | 10 days | Agricillin® | Agri Laboratories, Ltd.
Penicillin G (procaine) | OTC | 48 hours | 14 days | Bactracillin G® | Aspen Veterinary Resources
Penicillin G (procaine) | OTC | 48 hours | 14 days | Norocillin | Norbrook Laboratories, Ltd.
Penicillin G (procaine) | OTC | 48 hours | 14 days | Penicillin Injectable | Durvet, Inc.
Penicillin G (procaine) | OTC | 48 hours | 14 days | PenOne Pro™ | MWI Veterinary Supply
Penicillin G (procaine) | OTC | 48 hours | 4 days | Pro-Pen-G™ Injection | Bimeda, Inc.
Sometribove zinc | OTC | None | None | Posilac | Elanco Animal Health
Sulfadimethoxine | Rx | 60 hours | 5 days | Di-Methox Injection 40% | Agri Laboratories, Ltd.
Tripehannamine hydrochloride | Rx | 24 hours | 4 days | Recovr Injectable | Kinetic Technologies

Chapter 8: Approved Drugs and Screening Tests
### FDA-Approved Drugs for Intramammary Use

**Lactating Cows**

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Drug Type</th>
<th>Milk Withholding Time</th>
<th>Meat Withholding Time</th>
<th>Product Name</th>
<th>Manufacturer/Marketer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin trihydrate</td>
<td>Rx</td>
<td>60 hours</td>
<td>12 days</td>
<td>Amoxi-Mast®</td>
<td>Merck Animal Health</td>
</tr>
<tr>
<td>Ceftiofur hydrochloride</td>
<td>Rx</td>
<td>72 hours</td>
<td>2 days</td>
<td>SPECTRAMAST™ LC</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Cephapirin (sodium)</td>
<td>OTC</td>
<td>96 hours</td>
<td>4 days</td>
<td>Today®</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td>Cloxacillin (sodium)</td>
<td>Rx</td>
<td>48 hours</td>
<td>10 days</td>
<td>Dariclo®</td>
<td>Merck Animal Health</td>
</tr>
<tr>
<td>Hetacillin (potassium)</td>
<td>Rx</td>
<td>72 hours</td>
<td>10 days</td>
<td>Hetacin®K</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td>Penicillin G (procaine)</td>
<td>OTC</td>
<td>60 hours</td>
<td>3 days</td>
<td>Hanford's/US Vet MASTICLEAR®</td>
<td>G.C. Hanford Mfg. Co.</td>
</tr>
<tr>
<td>Pirlimycin</td>
<td>Rx</td>
<td>36 hours</td>
<td>9 days*</td>
<td>Pirsue® Sterile Solution</td>
<td>Zoetis, Inc.</td>
</tr>
</tbody>
</table>

* 9-day meat withhold following infusion twice at a 24-hour interval. 21-day meat withhold following any extended duration of therapy (infusion longer than twice at 24-hour interval up to 8 consecutive days).

### FDA-Approved Drugs for Oral Use

**Lactating Cows**

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Drug Type</th>
<th>Milk Withholding Time</th>
<th>Meat Withholding Time</th>
<th>Product Name</th>
<th>Manufacturer/Marketer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fenbendazole</td>
<td>OTC</td>
<td>None</td>
<td>8 days</td>
<td>Safe-Guard 10% Paste</td>
<td>Merck Animal Health</td>
</tr>
<tr>
<td>Magnesium hydroxide</td>
<td>OTC</td>
<td>None</td>
<td>8 days</td>
<td>Safe-Guard 10% Suspension</td>
<td>Merck Animal Health</td>
</tr>
<tr>
<td>Poloxalene</td>
<td>OTC</td>
<td>None</td>
<td>None</td>
<td>Bloat Guard® Top Dressing</td>
<td>Phibro Animal Health</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>None</td>
<td>None</td>
<td>TheraBloat® Drench Concentrate</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Sulfadimethoxine</td>
<td>Rx</td>
<td>60 hours</td>
<td>7 days</td>
<td>ALBON® Bolus</td>
<td>Zoetis, Inc.</td>
</tr>
</tbody>
</table>
## FDA-Approved Drugs for Feed Additive Use
### Lactating Cows

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Drug Type</th>
<th>Milk Withholding Time</th>
<th>Meat Withholding Time</th>
<th>Product Name</th>
<th>Manufacturer/Marketer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fenbendazole</td>
<td>OTC</td>
<td>None</td>
<td>13 days</td>
<td>Safe-Guard 0.5% Top Dress Pellets</td>
<td>Merck Animal Health</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>None</td>
<td>13 days</td>
<td>Safe-Guard 1.96%</td>
<td>Merck Animal Health</td>
</tr>
<tr>
<td>Monensin (sodium)</td>
<td>OTC</td>
<td>None</td>
<td>14 days</td>
<td>Rumate® 88</td>
<td>Phibro Animal Health</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>None</td>
<td>None</td>
<td>Rumensin 90</td>
<td>Elanco Animal Health</td>
</tr>
<tr>
<td>Poloxalene</td>
<td>OTC</td>
<td>None</td>
<td>None</td>
<td>Bloat Guard® Liquid - Type A Medicated Article</td>
<td>Phibro Animal Health</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>None</td>
<td>None</td>
<td>Bloat Guard® Medicated Top Dressing</td>
<td>Phibro Animal Health</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>None</td>
<td>None</td>
<td>Bloat Guard® Type A Medicated Article</td>
<td>Phibro Animal Health</td>
</tr>
</tbody>
</table>

## FDA-Approved Drugs for Intravaginal Administration Use
### Lactating Cows

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Drug Type</th>
<th>Milk Withholding Time</th>
<th>Meat Withholding Time</th>
<th>Product Name</th>
<th>Manufacturer/Marketer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progesterone</td>
<td>OTC</td>
<td>None</td>
<td>None</td>
<td>EAZI-Breed® CIDR® Cattle Insert</td>
<td>Zoetis, Inc.</td>
</tr>
</tbody>
</table>

## FDA-Approved Drugs for Topical Use
### Lactating Cows

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Drug Type</th>
<th>Milk Withholding Time</th>
<th>Meat Withholding Time</th>
<th>Product Name</th>
<th>Manufacturer/Marketer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balsam peru oil</td>
<td>OTC</td>
<td>None</td>
<td>None</td>
<td>Granulex Aerosol Spray</td>
<td>Mylan Institutional, Inc.</td>
</tr>
<tr>
<td>Castor oil</td>
<td>OTC</td>
<td>None</td>
<td>None</td>
<td>Granulex Aerosol Spray</td>
<td>Mylan Institutional, Inc.</td>
</tr>
<tr>
<td>Eprinomectin</td>
<td>OTC</td>
<td>None</td>
<td>None</td>
<td>EPRINEX Pour-On for Beef &amp; Dairy Cattle</td>
<td>Merial, Inc.</td>
</tr>
<tr>
<td></td>
<td>OTC</td>
<td>None</td>
<td>None</td>
<td>Eprizero™ Pour-On for Beef and Dairy Cattle</td>
<td>Norbook Laboratories Limited</td>
</tr>
<tr>
<td>Moxidectin</td>
<td>OTC</td>
<td>None</td>
<td>None</td>
<td>Cydectin® (moxidectin) 0.5% Pour-On for Cattle</td>
<td>Boehringer Ingelheim Vetmedica, Inc.</td>
</tr>
<tr>
<td>Oxytetracycline hydrochloride/Polymyxin B sulfate</td>
<td>Rx</td>
<td>None</td>
<td>None</td>
<td>Terramycin® Ophthalmic Ointment with Polymyxin</td>
<td>Zoetis, Inc.</td>
</tr>
<tr>
<td>Trypsin</td>
<td>OTC</td>
<td>None</td>
<td>None</td>
<td>Granulex Aerosol Spray</td>
<td>Mylan Institutional, Inc.</td>
</tr>
</tbody>
</table>
### Serum and Urine Screening Tests

**Screening Tests Available as of January 2018**

Can be used in any dairy animal for detecting drug residues in serum and urine.

<table>
<thead>
<tr>
<th>Residues Detected</th>
<th>Test Name</th>
<th>Sponsor</th>
<th>Specimen</th>
<th>Sensitivity (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>Charm II Beta-lactam Test</td>
<td>Charm Sciences</td>
<td>Serum</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>Charm II Beta-lactam Test</td>
<td>Charm Sciences</td>
<td>Urine</td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>Charm KIS Test</td>
<td>Charm Sciences</td>
<td>Serum</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Charm KIS Test</td>
<td>Charm Sciences</td>
<td>Urine</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Charm SL Beta-lactam Test for Urine</td>
<td>Charm Sciences</td>
<td>Urine</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Meatsafe™ ß-Lactam One-Step Test</td>
<td>Silver Lake Research Corporation</td>
<td>Urine</td>
<td>†</td>
</tr>
<tr>
<td></td>
<td>Premi®test</td>
<td>DSM Food Specialties USA, Inc</td>
<td>Urine</td>
<td>5</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>Charm II Beta-lactam Test</td>
<td>Charm Sciences</td>
<td>Serum</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Charm II Beta-lactam Test</td>
<td>Charm Sciences</td>
<td>Urine</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>Charm KIS Test</td>
<td>Charm Sciences</td>
<td>Serum</td>
<td>100</td>
</tr>
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Chloramphenicol D | Charm II Chloramphenicol Test | Charm Sciences | Serum | 0.3
Chloramphenicol D | Charm II Chloramphenicol Test | Charm Sciences | Urine | 10
Chloromycine | Charm II Tetracycline Test | Charm Sciences | Serum | 200
Chloromycine | Charm II Tetracycline Test | Charm Sciences | Urine | 3000
Chloromycine | Charm KIS Test | Charm Sciences | Serum | 10,000
Chloromycine | Charm KIS Test | Charm Sciences | Urine | 10,000
Chloromycine | Premi®test | DSM Food Specialties USA, Inc | Urine | 50
Chloromycine | Veratox for Tetracycline | Neogen Corporation | Serum | 2
Chloromycine | Veratox for Tetracycline | Neogen Corporation | Urine | 2
Clexacillin | Charm II Beta-lactam Test | Charm Sciences | Serum | 2500
Clexacillin | Charm II Beta-lactam Test | Charm Sciences | Urine | 10,000
Clexacillin | Charm KIS Test | Charm Sciences | Serum | 500
Clexacillin | Charm KIS Test | Charm Sciences | Urine | 500
Clexacillin | Charm SL Beta-lactam Test for Urine | Charm Sciences | Urine | 300
Clexacillin | Meatsafe™ β-Lactam One-Step Test | Silver Lake Research Corporation | Urine | 1
Clexacillin | Premi®test | DSM Food Specialties USA, Inc | Urine | 50
Danofloxacin | Premi®test | DSM Food Specialties USA, Inc | Urine | 600
Danofloxacin | Veratox for Fluoroquinolone | Neogen Corporation | Serum | 1
Danofloxacin | Veratox for Fluoroquinolone | Neogen Corporation | Urine | 1
Dihydrostreptomycin | Charm II Streptomycin Test | Charm Sciences | Serum | 100
Dihydrostreptomycin | Charm II Streptomycin Test | Charm Sciences | Urine | 2000
Dihydrostreptomycin | Charm KIS Test | Charm Sciences | Serum | 5000
Dihydrostreptomycin | Charm KIS Test | Charm Sciences | Urine | 5000
Dihydrostreptomycin | Premi®test | DSM Food Specialties USA, Inc | Urine | 3000
Enrofloxacin | Charm Enroflo Test (ROSA Test) | Charm Sciences | Urine | 100
Enrofloxacin | Premi®test | DSM Food Specialties USA, Inc | Urine | 600
Enrofloxacin | Veratox for Enrofloxacin | Neogen Corporation | Serum | 1
Enrofloxacin | Veratox for Enrofloxacin | Neogen Corporation | Urine | 1
Enrofloxacin | Veratox for Fluoroquinolone | Neogen Corporation | Serum | 1
Enrofloxacin | Veratox for Fluoroquinolone | Neogen Corporation | Urine | 1

Predicts pass or fail on USDA tissue residue tests.
Prohibited from use in any kind of lactating cattle.
# Serum and Urine Screening Tests

## Screening Tests Available as of January 2018

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* Predicts pass or fail on USDA tissue residue tests.*
## Serum and Urine Screening Tests

### Screening Tests Available as of January 2018

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Predicts pass or fail on USDA tissue residue tests.
### Serum and Urine Screening Tests

**Screening Tests Available as of January 2018**

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<th>Residue Detected</th>
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**Notes from publication:**
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**Copywriter:** M Fredrick
**Production Artist:** E Jurkovic
**Proofreader:** M Kaminsky
**Account:** A Stibor
**Due To Pub:** 11/14

**Important Safety Information:**
People with known hypersensitivity to penicillin or cephalosporins should avoid exposure to SPECTRAMAST DC. Product requires a 30-day dry cow period, and has a 16-day pre-slaughter withdrawal period following last treatment. Use of this product in a manner other than that prescribed on the label, or failure to adhere to the proper milk discard period, will result in violative residues. See Brief Summary of Prescribing Information on p. X.

Refer to the RMG-1144 label for complete instructions on proper administration of dry off and removal of milking equipment before re-entry into the dry cow period.
### Milk Screening Tests

<table>
<thead>
<tr>
<th>Residues Detected</th>
<th>Tolerance (ppb)</th>
<th>Test Name</th>
<th>Sponsor</th>
<th>Sensitivity (ppb)</th>
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# Tolerance is the maximum legally allowable level or concentration of a drug or chemical in a food product at the time milk is marketed or the animal is slaughtered.

▲ Evaluated by FDA and Accepted by National Conference on Interstate Milk Shipments (NCIMS).

● Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revision #16 and FDA memoranda (1/30/18, 11/27/18, and 12/20/18).
Milk Screening Tests

Not all of the tests listed below have been evaluated by FDA and accepted by the National Conference on Interstate Milk Shipments (NCIMS) for residue testing. Refer to M-a-85 (latest revision) or M-1-92-11. These tests are believed to be reliable indicators of antibiotic contamination in milk and should be viewed as tools to screen bulk tank milk.

<table>
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<tr>
<th>Residues Detected</th>
<th>Tolerance (ppb)</th>
<th>Test Name</th>
<th>Sponsor</th>
<th>Sensitivity (ppb)</th>
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¥ No official tolerance or target testing levels have been established by the FDA.
* Evaluated by FDA and Accepted by National Conference on Interstate Milk Shipments (NCIMS).
# Tolerance is the maximum legally allowable level or concentration of a drug or chemical in a food product at the time milk is marketed or the animal is slaughtered.
• Sensitivities based on evaluations of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported FDA memo M-a-85 Revision #15 and FDA memorandum (8/29/16).
No official tolerance or target testing levels have been established by the FDA. The tolerance was established for the marker residue, not the parent compound. The ceftiofur tolerance has been changed from 50 ppb ceftiofur (parent drug) to 100 ppb ceftiofur marker residue.

Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revision #16 and FDA memorandum (1/30/18, 11/27/18, and 12/20/18).

<table>
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<tr>
<th>Residues Detected</th>
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<th>Test Name</th>
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<th>Sensitivity (ppb)</th>
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¥ No official tolerance or target testing levels have been established by the FDA.
* Evaluated by FDA and Accepted by National Conference on Interstate Milk Shipments (NCIMS).
£ The tolerance was established for the marker residue, not the parent compound. The ceftiofur tolerance has been changed from 50 ppb ceftiofur (parent drug) to 100 ppb ceftiofur marker residue (DCA, desfuroylceftiofur metabolite derivative).
● Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revision #16 and FDA memorandum (1/30/18, 11/27/18, and 12/20/18).
### Milk Screening Tests

Not all of the tests listed below have been evaluated by FDA and accepted by the National Conference on Interstate Milk Shipments (NCIMS) for residue testing. Refer to M-a-85 (latest revision) or M-1-92-11. These tests are believed to be reliable indicators of antibiotic contamination in milk and should be viewed as tools to screen bulk tank milk.

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<tr>
<th>Residues Detected</th>
<th>Tolerance (ppb)</th>
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<th>Sensitivity (ppb)</th>
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| Ceftriaxone | 100 | BetaStar® Advanced for Beta-lactams | Neogen Corporation | 92.7 |
| Ceftriaxone | 100 | Charm 3 SL3 Beta-lactam Test* | Charm Sciences | 79* |
| Ceftriaxone | 100 | Charm B. stearothermophilus Tablet Disc Assay* | Charm Sciences | >100* |
| Ceftriaxone | 100 | Charm Beta-lactum 30 Second Test | Charm Sciences | 73 |
| Ceftriaxone | 100 | Charm Blue Yellow II Test | Charm Sciences | 100 |
| Ceftriaxone | 100 | Charm Cowside II Test | Charm Sciences | >100 |
| Ceftriaxone | 100 | Charm Flunixin and Beta-lactam Test* | Charm Sciences | 63* |
| Ceftriaxone | 100 | Charm HPLC-Receptogram | Charm Sciences | 30-40 |
| Ceftriaxone | 100 | Charm II Beta-lactam Test* (Competitive) | Charm Sciences | 47* |
| Ceftriaxone | 100 | Charm II Beta-lactam Test* (Quantitative) | Charm Sciences | 8.0* |
| Ceftriaxone | 100 | Charm II Beta-lactam Test* (Sequential) | Charm Sciences | 58* |
| Ceftriaxone | 100 | Charm MRL Beta-lactam RF Tetracycline 2 Minute Test | Charm Sciences | 70 |

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* Tolerance is the maximum legally allowable level or concentration of a drug or chemical in a food product at the time milk is marketed or the animal is slaughtered.
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<th>Sensitivity (ppb)</th>
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¥ No official tolerance or target testing levels have been established by the FDA.
▲ Evaluated by FDA and Accepted by National Conference on Interstate Milk Shipments (NCIMS).
★ The use of chloramphenicol in any food-producing animal is strictly forbidden under federal law. Consider testing for chloramphenicol in purchased new additions to the lactating herd or in other instances where the drug treatment history is unknown.
## Tolerance is the maximum legally allowable level or concentration of a drug or chemical in a food product at the time milk is marketed or the animal is slaughtered.
● The sensitivity of the test method was determined by independent research at Virginia Polytechnic Institute and State University.

Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revision #16 and FDA memoranda (1/30/18, 11/27/18, and 12/20/18).
### Milk Screening Tests

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<th>Residues Detected</th>
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<th>Sponsor</th>
<th>Sensitivity (ppb)</th>
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| Cephamycin        | 20 $^¥$      | BetaStar® Advanced for Beta-lactams | Neogen Corporation | 18.1|
|                   | 20 $^¥$      | Charm Beta-lactam 30 Second Test | Charm Sciences | 13   |
|                   | 20 $^¥$      | Charm 3 SL3 Beta-lactam Test* | Charm Sciences | 20.0 $^*$$^\dag$ |
|                   | 20 $^¥$      | Charm B. stearothermophilus Tablet Disc Assay* | Charm Sciences | 11.7 $^*$$^\dag$ |
|                   | 20 $^¥$      | Charm Blue Yellow II Test | Charm Sciences | 6    |
|                   | 20 $^¥$      | Charm Cowside II Test | Charm Sciences | 10   |
|                   | 20 $^¥$      | Charm Flunixin and Beta-lactam Test* | Charm Sciences | 13.4 $^*$$^\dag$ |
|                   | 20 $^¥$      | Charm HPLC-Receptogram | Charm Sciences | 2    |
|                   | 20 $^¥$      | Charm II Beta-lactam Test* (Competitive) | Charm Sciences | 4.2 $^*$$^\dag$ |
|                   | 20 $^¥$      | Charm II Beta-lactam Test* (Quantitative) | Charm Sciences | 4.1 $^*$$^\dag$ |
|                   | 20 $^¥$      | Charm II Beta-lactam Test* (Sequential) | Charm Sciences | 4.1  |
|                   | 20 $^¥$      | Charm MRL Beta-lactam 1 Minute Test | Charm Sciences | 20   |
|                   | 20 $^¥$      | Charm MRL Beta-lactam 3 Minute Test | Charm Sciences | 30   |
|                   | 20 $^¥$      | Charm MRL Beta-lactam and Tetracycline 2 Minute Test | Charm Sciences | 25   |
|                   | 20 $^¥$      | Charm MRL Beta-lactam and Tetracycline Test | Charm Sciences | 8    |
|                   | 20 $^¥$      | Charm MRL Beta-lactam RF Tetracycline 2 Minute Test | Charm Sciences | 20   |
|                   | 20 $^¥$      | Charm MRL Beta-lactam Test | Charm Sciences | 10   |
|                   | 20 $^¥$      | Charm Quad 1 Test | Charm Sciences | 10   |
|                   | 20 $^¥$      | Charm Quad Test | Charm Sciences | 30   |

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$^¥$ No official tolerance or target testing levels have been established by the FDA.

$^\dag$ Evaluated by FDA and accepted by National Conference on Interstate Milk Shipments (NCIMS).

$^\ddagger$ 90/95% concentrations were not determined for sensitivities significantly above the tolerance/safe level.

$^\#$ Tolerance is the maximum legally allowable level or concentration of a drug or chemical in a food product at the time milk is marketed or the animal is slaughtered.

$^*$ Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revision #16 and FDA memoranda (1/30/18, 11/27/18, and 12/20/18).
### Milk Screening Tests

<table>
<thead>
<tr>
<th>Residues Detected</th>
<th>Tolerance (ppb)</th>
<th>Test Name</th>
<th>Sponsor</th>
<th>Sensitivity (ppb)</th>
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* Values indicate the FDA-established target testing levels and do not represent official tolerance levels. Target testing levels are used by the FDA as guides for deciding whether or not to prosecute. They are not and cannot be transformed into tolerances that are established for animal drugs under section 512 (b) of the Federal Food, Drug & Cosmetic Act. They are not binding, do not dictate any result, do not limit the FDA’s discretion in any way, and do not protect milk producers (or milk) from court enforcement action.

*+ Evaluated by FDA and Accepted by National Conference on Interstate Milk Shipments (NCIMS).

† Tolerance is the maximum legally allowable level or concentration of a drug or chemical in a food product at the time milk is marketed or the animal is slaughtered.

• Predetermined pass or fail on USDA tissue residue tests.

# The sensitivity of the test method was determined by independent research at Virginia Polytechnic Institute and State University.

• Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revisions #16 and FDA Memorandums (1/30/18, 11/27/18, and 12/28/18).
# Milk Screening Tests

Not all of the tests listed below have been evaluated by FDA and accepted by the National Conference on Interstate Milk Shipments (NCIMS) for residue testing. Refer to M-a-85 (latest revision) or M-1-92-11. These tests are believed to be reliable indicators of antibiotic contamination in milk and should be viewed as tools to screen bulk tank milk.

<table>
<thead>
<tr>
<th>Residues Detected</th>
<th>Tolerance (ppb)</th>
<th>Test Name</th>
<th>Sponsor</th>
<th>Sensitivity (ppb)</th>
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</table>

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<th>Sponsor</th>
<th>Sensitivity (ppb)</th>
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Milk Screening Tests

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<table>
<thead>
<tr>
<th>Residues Detected</th>
<th>Tolerance (ppb)</th>
<th>Test Name</th>
<th>Sponsor</th>
<th>Sensitivity (ppb)</th>
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</table>

† No official tolerance or target testing levels have been established by the FDA.
❖ Evaluated by FDA and Accepted by National Conference on Interstate Milk Shipments (NCIMS).
‡ Tolerance is the maximum legally allowable level or concentration of a drug or chemical in a food product at the time milk is marketed or the animal is slaughtered.
†† The sensitivity of the test method was determined by independent research at Virginia Polytechnic Institute and State University.
∗ Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revision †† and FDA memoranda (1/30/18, 11/27/18, and 12/20/18).
### Milk Screening Tests

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<table>
<thead>
<tr>
<th>Residues Detected</th>
<th>Tolerance (ppb)</th>
<th>Test Name</th>
<th>Sponsor</th>
<th>Sensitivity (ppb)</th>
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</table>

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<th>Sponsor</th>
<th>Sensitivity (ppb)</th>
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<td><strong>Hetacillin</strong></td>
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</table>

| Kanamycin        | None⁹          | Charm B. stearothermophilus Tablet Disc Assay | Charm Sciences | 1000 |
|                  | None⁹          | Charm II Gentamicin and Streptomycin Test | Charm Sciences | 1000 |
|                  | None⁹          | Charm Quad 3 Test | Charm Sciences | 100 |
|                  | None⁹          | Delvotest SP-NT | DSM Food Specialties USA, Inc | 5000 |
|                  | None⁹          | Delvotest T | DSM Food Specialties USA, Inc | 1310 |
|                  | None⁹          | Eclipse® 3G | ZEU-Immunotec | >2000 |

| Lincomycin       | None⁹          | Charm Blue Yellow II Test | Charm Sciences | 150 |
|                  | None⁹          | Charm Cowside II Test | Charm Sciences | 150 |
|                  | None⁹          | Charm II Macrolide Test | Charm Sciences | 100 |
|                  | None⁹          | Charm Quad 2 Test | Charm Sciences | 150 |
|                  | None⁹          | Delvotest P 5 Pack | DSM Food Specialties USA, Inc | 400-1000 |
|                  | None⁹          | Delvotest P/Delvotest P Mini | DSM Food Specialties USA, Inc | 400-1000 |
|                  | None⁹          | Delvotest SP-NT | DSM Food Specialties USA, Inc | 156 |
|                  | None⁹          | Delvotest T | DSM Food Specialties USA, Inc | 180 |
|                  | None⁹          | Eclipse® 3G | ZEU-Immunotec | 150 |

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Prohibited from use in any kind of lactating cattle.

Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revision #16 and FDA memoranda (1/30/18, 11/27/18, and 12/20/18).
Milk Screening Tests

Chapter 8: Approved Drugs and Screening Tests

<table>
<thead>
<tr>
<th>Residues Detected</th>
<th>Tolerance (ppb)</th>
<th>Test Name</th>
<th>Sponsor</th>
<th>Sensitivity (ppb)</th>
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</table>

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▲ No official tolerance or target testing levels have been established by the FDA.

▲ Values indicate the FDA-established target testing levels and do not represent official tolerance levels. Target testing levels are used by the FDA as guides for deciding whether or not to prosecute. They are not and cannot be transformed into tolerances that are established for animal drugs under section 512 (b) of the Federal Food, Drug & Cosmetic Act. They are not binding, do not dictate any result, do not limit the FDA's discretion in any way, and do not protect milk producers (or milk) from court enforcement action.

▲ Evaluated by FDA and Accepted by National Conference on Interstate Milk Shipments (NCIMS).

▲ Prohibited from use in any kind of lactating cattle.

▲ Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revision #16 and FDA memoranda 1/30/18, 11/27/18, and 12/20/18.
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<th>Test Name</th>
<th>Sponsor</th>
<th>Sensitivity (ppb)</th>
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<tbody>
<tr>
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¥ No official tolerance or target testing levels have been established by the FDA.

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### Milk Screening Tests

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#### Residues Detected

<table>
<thead>
<tr>
<th>Residues Detected</th>
<th>Tolerance (ppb)</th>
<th>Test Name</th>
<th>Sponsor</th>
<th>Sensitivity (ppb)</th>
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<th>Sensitivity (ppb)</th>
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<td>Sulfadiazine *</td>
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| Sulfadiazine *     | 10 ^           | Charm Blue Yellow II Test | Charm Sciences | 50               |
|                   | 10 ^           | Charm Cowside II Test | Charm Sciences | 50               |
|                   | 10 ^           | Charm HPLC-Receptogram | Charm Sciences | 5                |
|                   | 10 ^           | Charm II Sulf Drug Test (Competitive Assay) | Charm Sciences | 4.9 *             |
|                   | 10 ^           | Charm Quad 1 Test | Charm Sciences | 20               |
|                   | 10 ^           | Charm ROSA Sulf Test | Charm Sciences | 4                |
|                   | 10 ^           | Charm TRIO Test | Charm Sciences | 3                |
|                   | 10 ^           | Delvotest SP-NT | DSM Food Specialties USA, Inc | 50               |
|                   | 10 ^           | Delvotest T | DSM Food Specialties USA, Inc | 50               |
|                   | 10 ^           | Eclipse® 3G | ZEU-Immunotec | 100              |

| Sulfadimethoxine   | 10 ^           | BetaStar S for Sulfonamides | Neogen Corporation | 10               |
|                   | 10 ^           | Charm B. stearothermophilus Tablet Disc Assay | Charm Sciences | 10,000            |
|                   | 10 ^           | Charm Cowside II Test | Charm Sciences | 25               |
|                   | 10 ^           | Charm HPLC-Receptogram | Charm Sciences | 5                |
|                   | 10 ^           | Charm II Sulf Drug Test M (Competitive Assay) | Charm Sciences | 4.0 *             |
|                   | 10 ^           | Charm ROSA Sulf Test | Charm Sciences | 7.7               |
|                   | 10 ^           | Charm TRIO Test | Charm Sciences | 7.6               |
|                   | 10 ^           | Delvotest SP-NT | DSM Food Specialties USA, Inc | 100              |
|                   | 10 ^           | Delvotest T | DSM Food Specialties USA, Inc | 40               |

| Sulfadoxine *      | None ¤          | BetaStar S for Sulfonamides | Neogen Corporation | 30-40            |
|                   | None ¤          | Charm Blue Yellow II Test | Charm Sciences | 100              |
|                   | None ¤          | Charm Cowside II Test | Charm Sciences | 100              |
|                   | None ¤          | Charm II Sulf Drug Test | Charm Sciences | 7                |

**Note:** For a complete list of approved drugs and screening tests, refer to M-a-85 or M-1-92-11.
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### Milk Screening Tests

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<td>ZEU-Inmunotec</td>
<td>40</td>
</tr>
</tbody>
</table>
## Milk Screening Tests

### Only Use Drugs Approved for Lactating Dairy Cows

Screening Tests Available as of January 2018 for Detecting Residues in Bulk Tank Milk.

Tests listed below have been neither evaluated by FDA nor accepted by the National Conference on Interstate Milk Shipments (NCIMS) for residue testing. Refer to M-a-85 or M-I-92-11 (latest revisions) for current listing.

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Residues Detected At or Below Safe/Tolerance Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4 D RaPID Assay</td>
<td>2,4-D</td>
</tr>
<tr>
<td>Atrazine RaPID Assay</td>
<td>Atrazine</td>
</tr>
<tr>
<td>Benomyl RaPID Assay</td>
<td>Carbendazim</td>
</tr>
<tr>
<td>BetaStar 4D</td>
<td>Beta-lactam, Tetracycline, Streptomycin, Chloramphenicol</td>
</tr>
<tr>
<td>BetaStar for Quinolone</td>
<td>Quinolones</td>
</tr>
<tr>
<td>BetaStar S</td>
<td>Beta-lactam</td>
</tr>
<tr>
<td>BetaStar S Combo</td>
<td>Beta-lactam, Tetracycline</td>
</tr>
<tr>
<td>Charm Beta -lactam 30 Second Test</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephrarin, Cloxacillin, Penicillin</td>
</tr>
<tr>
<td>Charm Blue Yellow II Test</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephrarin, Chlortetracycline, Hetacillin,Lincomycin, Neomycin, Oxytetracycline, Penicillin, Pirlimycin, Tetracycline, Tilmicosin, Tylosin</td>
</tr>
<tr>
<td>Charm Cowside II Test</td>
<td>Amoxicillin, Ampicillin, Cephrarin, Chlortetracycline, Hetacillin, Neomycin, Oxytetracycline, Penicillin, Pirlimycin, Tetracycline, Tilmicosin, Tylosin</td>
</tr>
<tr>
<td>Charm MRL Beta-lactam 1 Minute Test</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephrarin, Hetacillin, Penicillin</td>
</tr>
<tr>
<td>Charm MRL Beta-lactam 3 Minute Test</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephrarin, Hetacillin, Penicillin</td>
</tr>
<tr>
<td>Charm MRL Beta-lactam and RF Tetracycline 2 Minute Test</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephrarin, Chlortetracycline, Hetacillin, Oxytetracycline, Penicillin, Tetracycline</td>
</tr>
<tr>
<td>Charm MRL Beta-lactam and Tetracycline 2 Minute Test</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephrarin, Chlortetracycline, Hetacillin, Oxytetracycline, Penicillin, Tetracycline</td>
</tr>
<tr>
<td>Charm MRL Beta-lactam and Tetracycline Test</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephrarin, Chlortetracycline, Hetacillin, Oxytetracycline, Penicillin, Tetracycline</td>
</tr>
<tr>
<td>Charm MRL Beta-lactam Test</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephrarin, Hetacillin, Penicillin</td>
</tr>
<tr>
<td>Charm Quad 1 Test</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephrarin, Chlortetracycline, Hetacillin, Oxytetracycline, Penicillin, Tetracycline</td>
</tr>
<tr>
<td>Charm Quad 2 Test</td>
<td>Erythromycin, Lincomycin, Pirlimycin, Tilmicosin, Tylosin</td>
</tr>
<tr>
<td>Charm Quad 3 Test</td>
<td>Dihydrostreptomycin, Neomycin</td>
</tr>
<tr>
<td>Charm Quad Test</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephrarin, Chlortetracycline, Dihydrostreptomycin, Hetacillin, Oxytetracycline, Penicillin, Streptomycin, Tetracycline</td>
</tr>
<tr>
<td>Charm ROSA Gentamicin Test</td>
<td>Gentamicin</td>
</tr>
</tbody>
</table>
Milk Screening Tests

**Only Use Drugs Approved for Lactating Dairy Cows**
Screening Tests Available as of January 2018 for Detecting Residues in Bulk Tank Milk.

Tests listed below have been evaluated by FDA and accepted by the National Conference on Interstate Milk Shipments (NCIMS) for residue testing. Refer to M-a-85 or M-I-92-11 (latest revisions) for current listing. These tests are believed to be reliable indicators of antibiotic contamination in milk and should be viewed as tools to screen bulk tank milk.

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Residues Detected At or Below Safe/Tolerance Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charm 3 SL3 Beta-lactam Test</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Cloxacillin, Penicillin</td>
</tr>
<tr>
<td>Charm B. stearothermophilus Tablet Disc Assay</td>
<td>Amoxicillin, Ampicillin, Cephapirin, Penicillin</td>
</tr>
<tr>
<td>Charm Flunixin and Beta-lactam Test</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Cloxacillin, Flunixin, Penicillin</td>
</tr>
<tr>
<td>Charm ROSA Tetracycline - SL Test (dilution confirmation)</td>
<td>Chloratetracycline, Oxytetracycline, Tetracycline</td>
</tr>
<tr>
<td>Charm II Beta-lactam Test (Competitive)</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Penicillin</td>
</tr>
<tr>
<td>Charm II Beta-lactam Test (Quantitative)</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Cloxacillin, Penicillin</td>
</tr>
<tr>
<td>Charm II Beta-lactam Test (Sequential)</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Penicillin</td>
</tr>
<tr>
<td>Charm II Sulfa Drug Test (Competitive Assay)</td>
<td>Sulfadiazine, Sulfamethazine, Sulfathiazole</td>
</tr>
<tr>
<td>Charm II Test for Cloxacillin in Milk (Competitive Assay)</td>
<td>Cloxacillin</td>
</tr>
<tr>
<td>Charm II Tetracycline Test</td>
<td>Chlortetracycline, Oxytetracycline, Tetracycline</td>
</tr>
<tr>
<td>Charm SL Beta-lactam Test</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Penicillin</td>
</tr>
<tr>
<td>Charm ROSA Sulfa Test</td>
<td>Sulfadiazine, Sulfamethazine, Sulfathiazole, Sulfachlorpyridazine, Sulfamerazine, Sulfamethizole, Sulfamethoxazole, Sulfapyridine, Sulfquinoline</td>
</tr>
<tr>
<td>Charm TRIO Test</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Chlortetracycline, Hetacillin, Oxytetracycline, Penicillin, Sulfachlorpyridazine, Sulfadiazine, Sulfamethazine, Sulfamerazine, Sulfamethizole, Sulfamethoxazole, Sulfapyridine, Sulfquinoline</td>
</tr>
<tr>
<td>Delvotest P 5 Pack</td>
<td>Amoxicillin, Ampicillin, Cephapirin, Penicillin</td>
</tr>
<tr>
<td>Delvotest P/Delvotest P Mini</td>
<td>Amoxicillin, Ampicillin, Cephapirin, Penicillin</td>
</tr>
<tr>
<td>New SNAP Beta-Lactam Test Kit</td>
<td>Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Penicillin</td>
</tr>
</tbody>
</table>
# Milk Screening Tests

**Only Use Drugs Approved for Lactating Dairy Cows**

Screening Tests Available as of January 2018 for Detecting Residues in Bulk Tank Milk.

Tests listed below have NEITHER been evaluated by FDA nor accepted by the National Conference on Interstate Milk Shipments (NCIMS) for residue testing. Refer to M-a-85 (latest revision) or M-1-92-11.

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<tr>
<th>Test Name</th>
<th>Residues Detected At or Below Safe/Tolerance Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charm 3 SL3 Beta-lactam Test</td>
<td>Hetacillin</td>
</tr>
<tr>
<td>Charm B. stearothermophilus Tablet Disc Assay</td>
<td>Hetacillin, Pirlimycin</td>
</tr>
<tr>
<td>Charm HPLC-Receptogram</td>
<td>Amoxicillin, Ampicillin, Cefotaxim, Cephalirax, Chlortetracycline, Cloxacillin, Penicillin, Sulfadiazine, Sulfadimethoxine, Sulfamethazine, Sulfachlorpyridazine, Sulfamerazine, Sulfamethizole, Sulfanilamide, Sulfapyridine, Sulfquinocine, Sulfathiazole, Oxytetracycline, Tetracycline</td>
</tr>
<tr>
<td>Charm II Aflatoxin Test</td>
<td>Aflatoxin M1</td>
</tr>
<tr>
<td>Charm II Beta-lactam Test (Competitive)</td>
<td>Hetacillin</td>
</tr>
<tr>
<td>Charm II Beta-lactam Test (Quantitative)</td>
<td>Hetacillin</td>
</tr>
<tr>
<td>Charm II Gentamicin and Neomycin Test</td>
<td>Gentamicin, Neomycin</td>
</tr>
<tr>
<td>Charm II Macrolide Test</td>
<td>Erythromycin, Pirlimycin, Tilmicosin, Tulathromycin, Tylosin</td>
</tr>
<tr>
<td>Charm II Novobiocin Test</td>
<td>Novobiocin</td>
</tr>
<tr>
<td>Charm II Streptomycin Test</td>
<td>Dihydrostreptomycin, Gentamicin</td>
</tr>
<tr>
<td>Charm MRL Aflatoxin Quantitative Test</td>
<td>Aflatoxin M1</td>
</tr>
<tr>
<td>Charm Pirlimycin Test</td>
<td>Pirlimycin</td>
</tr>
<tr>
<td>Charm ROSA Macrolide Test</td>
<td>Erythromycin, Pirlimycin, Tilmicosin, Tulathromycin</td>
</tr>
<tr>
<td>Charm ROSA Streptomycin Test</td>
<td>Dihydrostreptomycin</td>
</tr>
<tr>
<td>Charm ROSA Tetracycline Test</td>
<td>Chlortetracycline, Oxytetracycline, Tetracycline</td>
</tr>
<tr>
<td>Charm SL Aflatoxin Test (Quantitative)</td>
<td>Aflatoxin M1</td>
</tr>
<tr>
<td>Charm SL Beta-lactam Test</td>
<td>Hetacillin</td>
</tr>
<tr>
<td>Delvost P 5 Pack</td>
<td>Pirlimycin, Tetracycline</td>
</tr>
<tr>
<td>Delvost P/Delvotest P Mini</td>
<td>Pirlimycin, Tetracycline</td>
</tr>
<tr>
<td>Penzyme® Milk Test</td>
<td>Amoxicillin, Ampicillin, Cephalirax, Penicillin</td>
</tr>
<tr>
<td>Reveal for Aflatoxin in M1</td>
<td>Aflatoxin M1</td>
</tr>
<tr>
<td>SNAP Aflatoxin M1 Test</td>
<td>Aflatoxin M1</td>
</tr>
<tr>
<td>SNAP Gentamicin Test</td>
<td>Gentamicin</td>
</tr>
<tr>
<td>SNAP Sulfamethazine Test</td>
<td>Sulfamethazine</td>
</tr>
<tr>
<td>SNAP Tetracycline Test</td>
<td>Chlortetracycline, Oxytetracycline, Tetracycline</td>
</tr>
</tbody>
</table>
**Best Practice:** An animal care guideline, protocol or practice that achieves the desired outcome described by the corresponding Management Checklist Point. More than one best practice may exist for a corresponding outcome. For example, a best practice for an “effective record keeping system,” which is a FARM Program guideline outlined in Chapter 3, may be individual written animal health logs or a computer record system such as DairyComp 305.

**Bred Heifer:** A young, pregnant dairy animal that has not yet given birth to her first calf, typically 13-to-24 months of age.

**Distress:** Occurs when livestock are injured, sick or in pain.

**Dry Cows:** Non-lactating pregnant cows from the end of lactation until next parturition. A pregnant cow is generally dry or non-lactating for a period of 40-to-60 days before the next calving.

**Dystocia:** Difficult birth typically requiring assistance from the animal caretaker.

**End of Life:** On-farm death due to illness, euthanasia or death at a packing house.

**Growing Animals:** The period of time between weaning and first parturition during which an animal grows through puberty and begins to approach maturity, approximately from 6 weeks to 24 months of age. See also Bred Heifer, Open Heifer and Springing Heifer.

**Herd Health Plan:** An animal health management system developed with a veterinarian to prevent, diagnose, control and treat disease or injury of all dairy cattle on a farm.

**Lactating Dairy Cow:** Any bovine female that has had her first calf.

**Licensed Veterinarian:** Licensed by one or more state boards of veterinary medical examiners to practice veterinary medicine within the respective state(s).

**Milk-Fed Dairy Calf:** A calf being fed milk or milk replacer (and not suckling from the dam) from newborn through weaning.

**Milking Cows:** Cows that are lactating.

**Newborn:** The young of the domestic cow, from birth through colostrum feeding, typically the first 48 hours of life.

**Open Heifer:** A young bovine female that has not yet become pregnant.

**Pain:** An unpleasant physical sensation occurring in varying degrees of severity as consequence of injury, disease or from a medical or management procedure.

**Protocols:** Written processes that may include instructions provided by the Veterinarian of Record for the management of dairy cows in various situations and under various conditions.
**Special-Needs Animals:** Sick, injured or non-ambulatory dairy cattle.

**Springing Heifers:** A heifer that is in the last few weeks of pregnancy.

**Stockmanship:** The knowledgeable and skillful handling of cattle, based on accepted animal behavior principles, in a safe, efficient, effective and low-stress manner.

**Transition Cows:** Cows or heifers that are “transitioning” from the period of late gestation (pregnancy) through the period of early lactation, that is, about three weeks prior to and about three weeks after calving (periparturient period).

**Veterinarian-Client-Patient Relationship (VCPR):** The FARM Program uses the AVMA (2013) definition of a VCPR. A VCPR exists when:

- The veterinarian has assumed the responsibility for making medical judgments regarding the health of the patient and the client has agreed to follow the veterinarian’s instructions.
- The veterinarian has sufficient knowledge of the patient to initiate at least a general or preliminary diagnosis of the medical condition of the patient. This means that the veterinarian is personally acquainted with the keeping and care of the patient by virtue of:
  - A timely examination of the patient by the veterinarian, or
  - Medically appropriate and timely visits by the veterinarian to the operation where the patient is managed.
- The veterinarian is readily available for follow-up evaluation or has arranged for the following:
  - Veterinary emergency coverage, and
  - Continuing care and treatment.
- The veterinarian provides oversight of treatment, compliance and outcome.
- Patient records are maintained.

**Veterinarian of Record (VOR):** The Veterinarian of Record is the responsible party for providing appropriate oversight of drug use on the farm operation. Such oversight is a critical component of establishing, maintaining and validating a VCPR. This oversight should include but may not be limited to establishment of treatment protocols, training of personnel, review of treatment records, monitoring drug inventories, and assuring appropriate labeling of drugs.

**Weaned Animal:** A young calf that is no longer being fed milk or milk replacer and has been transitioned to eating only dry feed.

**Written Protocol:** A document that provides specific instructions to cow-side personnel for performing a single, specific task. As a training tool, written protocols improve communication and work consistency.

**Young Stock:** Animals from weaning to 20 months of age.
Contact Information

Companies Marketing Drug Residue Tests

**Charm Sciences Inc.**  
659 Andover St.  
Lawrence, MA 01843  
Phone: 800-343-2170

**DSM Food Specialties USA, Inc.**  
45 Waterview Blvd.  
Parsippany, NJ 07054  
Phone: 800-662-4478

**IDEXX Laboratories, Inc.**  
One IDEXX Drive  
Westbrook, ME 04092  
Phone: 800-548-9997

**Neogen Corporation**  
620 Lesher Place  
Lansing, MI 48912  
Phone: 800-234-5333

**Silver Lake**  
Research Corporation  
911 So. Primrose Ave. Ste. N  
Monrovia, CA 91016  
Phone: 888-438-1942

**Strategic Diagnostics, Inc.**  
111 Pencader Drive  
Newark, DE 19702  
Phone: 800-544-8881

**ZEU-Inmunotec, S.L.**  
Polígono Plaza  
C/Bari, 25 dpdo.  
50197 Zaragoza SPAIN  
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NATIONALDAIRYFARM.COM

Contact the National Milk Producers Federation

(703) 243-6111

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